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Some Laboratory Experiments to Test the Unity of Command Principle

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SOME LABORATORY EXPERIMENTS TO TEST
THE UNITY OF COMMAND PRINCIPLE

SOME LABORATORY EXPERIMENTS TO TEST
THE UNITY OF COMMAND PRINCIPLE

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

By

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CHAPTER I

INTRODUCTION

Statement of Purpose

Classical organization theory has encompassed certain generalizations which have become known as principles of management. Many have been contributed to the management literature by experienced practitioners of management such as Fayol, Mooney and Barnard and others who have contributed tremendously to this literature by their perceptive writings drawn from years of observation and experience in organizations.

However, in recent years some management theorists have criticized and challenged the generalizations of the early management writers as being less than scientific, "a priori" and intuitive. Professor Harold Koontz has described some of the disagreements among management scholars as a "management theory jungle".¹ Among the reasons he suggests for the existence of the jungle is the misunderstanding of principles. He suggests that it is necessary to develop a willingness to distill and test fundamentals in order to disentangle this jungle.²

¹Harold Koontz, "The Management Theory Jungle," Journal of the Academy of Management, Vol. IV, No. 3 (December, 1961), pp. 174-188.

²Ibid., p. 187.

One of the traditional principles of organization which has received widespread recognition is the principle of unity of command. This principle is usually stated in such a way as to indicate that no person in an organization should report to or take directions from more than one superior. In vernacular language it is sometimes stated as "every employee has only one boss".

This study was designed to test the validity of the principle of unity of command. Testing was done by means of a series of controlled laboratory experiments designed to determine how people behave under conditions simulating unity and disunity of command in organizations. Specifically, this study has these purposes:

1. To identify the principle of unity of command both from the point of view of the classical writers and the point of view of modern writers.
2. To survey the literature of management to determine recent and current attitudes toward the principle of unity of command.
3. To conduct and report the results of a series of laboratory experiments designed to test the validity of the principle of unity of command in terms of its effects on the performance and behavior of people.
4. To suggest, on the basis of the findings of this research, the extent to which the principle

should be observed in organizations, and possibly to restate the principle of unity of command.

5. To contribute to the general field of knowledge concerning the behavior of people in organizations.

Justification

The principle of unity of command appeals to common sense and has been taught to management students for many years. It was formulated, and enjoys wide spread recognition, on the basis of its logic. Yet, if management is to become a body of knowledge which has the respect of scholars and is of use to the practitioner, then its theories and principles must be tested scientifically and either verified, modified or rejected. March and Simon stated, "Perhaps the most critical failure of classical administrative science is that it does not confront theory with evidence".³ This study is an attempt to test and evaluate a fundamental concept in classical management theory.

Unity of command has been cited as a necessary dictum to be followed in all organizations.⁴ It has been purported to be essential because of the dangers of conflict and confusion when it is violated. However, it has not generally

³James G. March and Herbert A. Simon, Organizations (New York: John Wiley and Sons, Inc., 1958), p. 32.

⁴Frank P. Sherwood and Wallace H. Best, Supervisory Methods In Municipal Administration (Chicago: The International City Managers Association, 1958), p. 121.

been explicitly stated that its observation results in superior performance and output of subordinates. Very little empirical research has been done concerning human behavior under conditions of unity of command as opposed to conditions of disunity of command in organizations.

What has been accepted in the past as useful generalizations and approximations should be verified or interpreted to determine if complex organizations can continue to apply these principles. Research is one short cut that can effectively replace the slower more precarious road of trial and error in effecting this improvement of management by introducing system, purpose and planning into the investigation of the problems it studies.

The Concept

Although the idea of unity of command is often simplified into the "one boss" concept, the idea is proposed in this dissertation that unity of command comes not from the number of commanders but rather from the unification and oneness of purpose and objective of the command or commands which are received by the subordinate. The emphasis here is on the receiver or subordinate's interpretation of the command rather than the simple number of "bosses". An employee might receive unified commands from two or more superiors, each giving commands over different phases or activities of the employee's work. For example, one superior might direct the employee relative to what he is to do, while

other superiors tell him how or when to do it. As long as these commands are coordinated in terms of purpose and objective, they may truly be considered to be unified commands. However, conflicting commands may conceivably come from a single commander, while at the same time unified commands may come from two or more commanders. The usual reason given for the "one boss" recommendation is the assumption that unified commands would usually result from having a single commander or boss, while two commanders or bosses would likely issue conflicting commands.

The Problem

The research reported in this dissertation has been directed to this question: "Is there a significant difference in performance or attitude when individuals work under conditions of disunity of command as opposed to conditions of unity of command?"

If the principle of unity of command is to continue to be advocated in management literature, research is needed to provide an answer to this question. To continue to contend that the principle must be observed simply because there are certain potential dangers in its violation does not seem justifiable. If an answer, or even a qualified answer can be provided to this question, management has been advanced a pace forward toward becoming a systematized body of knowledge rather than self evident statements of conclusions from observation and experience.

The Hypothesis

The null hypothesis for this study is stated as follows:

"There is no significant difference in the performance or morale of individuals who work under conditions of unity of command and individuals who work under conditions of disunity of command".

Method of Testing the Hypothesis

This hypothesis was tested by conducting a series of laboratory experiments. Students in a College of Business Administration were used as subjects in two of the experiments. Army R. O. T. C. students were used as subjects in the third experiment. The subjects performed experimental tasks under conditions in which the independent variable was the presence of unity of command for the control group and disunity of command for the test group. The dependent variable was the quantity and quality of output of the subjects in the experimental tasks. Mean scores of performance of each group were calculated and significance of difference was determined at the .05 level of confidence.

The experimental design and the experimental tasks are described in detail in Chapter III.

Overview

The study is presented in the following manner:
Chapter II contains a survey of management literature relevant

to the principle of unity of command, its beginnings, its popular definitions, effects of its violation and influence on organizational theory and current philosophies regarding its importance in organizations. Chapter III combines a discussion on laboratory experimentation with a detailed description of the experimental design utilized in the study. Chapter IV presents the statistical data and the findings of the experiments. Chapter V includes the summary, conclusions and recommendations made from the findings of the study.

CHAPTER II

REVIEW OF THE LITERATURE

Early Concepts of Unity of Command

The concept of unity of command is not new. The early management writers advocated it as a necessary condition of good organization. It is still widely advocated and relatively few writers have denied its usefulness. When Jesus Christ said, "No man can serve two masters. . .",¹ he was perhaps laying the basis for formulation of this principle of organization. However, it must be recognized that Jesus was talking about man attempting to serve God and wealth at the same time rather than advocating a precept relating to the superior-subordinate relationship. Yet a number of management writers, including Gulick and Urwick, have utilized this Biblical passage as an argument in an effort to give credence to the principle.²

Perhaps one of the earliest individuals to write about the principle of unity of command as applied to a superior-subordinate relationship was Napoleon. In his *Maxims of War*, Maxim No. 64, he has written, "Nothing is more important in war than unity in command. When, therefore,

¹Holy Bible, Matt. 6:24.

²Luther Gulick and Lyndall F. Urwick, Papers on the Science of Administration (New York: Columbia University Press, 1937), p. 9.

you are carrying on hostilities against a single power only, you should have but one army acting on one line and led by one commander."³ This is of course a translation from the French. Another translator has used the word "undivided" for unity.⁴ In either translation it is evident that Napoleon, who was one of the world's greatest organizer and leader of men, recognized and advocated a precept which has today been embodied into a principle of management theory.

Fayol and Taylor

It seems likely that the principle of unity of command has come to a prominent place in management literature because an early management writer advocated a system of supervision which was later considered by some to be diametrically opposed to the principle of unity of command. Frederick W. Taylor advocated a system of several supervisors over the different activities of the worker, which he called the functional type. He wrote:

Throughout the whole field of management the military type of organization should be abandoned, and what may be called the 'functional type' substituted in its place. 'Functional management' consists in so dividing the work of management that each man from the assistant superintendent down shall have as few functions

³Thomas R. Phillips, Roots of Strategy (Harrisburg, Pennsylvania: The Military Service Publishing Company, 1940), p. 427.

⁴Napoleon's Maxims of War, trans. by Lieut. Gen. Sir G. C. D'Aguillar (Kansas City, Mo.: Hudson-Kimberly Publishing Co., ca. 1902), p. 121.

as possible to perform. If practicable the work of each man in the management should be confined to the performance of a single leading function.

Under the ordinary or military type the workmen are divided into groups. The men in each group receive their orders from one man only, the foreman or gang boss of that group. This man is the single agent through which the various functions of the management are brought into contact with the men. Certainly the most marked outward characteristic of functional management lies in the fact that each workman, instead of coming in direct contact with the management at one point only, namely, through his gang boss, receives his daily orders and help directly from eight different bosses, each of whom performs his own particular functions.⁵

Hence, Taylor advocated dropping the one boss concept even before it became known in management literature as unity of command. Taylor was critical of military organization in which the one boss concept was considered essential.

Henri Fayol, a successful French industrialist, a few years later, rebutted Taylor's functional foremanship by saying:

According to Taylor the ordinary type of organization referred to somewhat scornfully by him as 'military,' wherein workers receive instructions from one man only--shop foreman or gang boss--is to be abandoned. . . . So deep-rooted, however, is the conviction that the very foundation of management rests in the military type as represented by the principle that no workman can work under two bosses at the same time that the writer has never yet

⁵Frederick Winslow Taylor, "Shop Management" in Scientific Management (New York: Harper and Row, Publishers, 1947), p. 99.

found one except among the works which he had assisted in organizing, who came out squarely and acknowledged that he was using functional foremanship because it was the right principle. According to Taylor himself some adherents to the principle of unity of command would not abjure it even at his instance. For myself, I do not think that a shop can be well run in flagrant violation of this.

I think it dangerous to allow the idea to gain ground that unity of command is unimportant and can be violated with impunity. So, until things change, let us treasure the old type of organization in which unity of command is honoured.⁶

Taylor and Fayol represent early opposing views on the nature and importance of unity of command in organizational theory. Taylor advocated functional foremanship as a method of providing expertise of supervision in various phases of the activities which were involved in the workers' responsibilities. He felt that workers needed information and directives of an expert nature which could best be provided by specialized functional supervisors. Taylor contended that no single supervisor could possess sufficient knowledge of all aspects of the activities of the workers to be able to provide this expertise. Fayol, on the other hand, contended that unity of command was a paramount principle and should be retained because of the problems which would result from its violation.

⁶Henri Fayol, General and Industrial Management, trans. by Constance Storrs (London: Sir Isaac Pitman and Sons Ltd., 1949), pp. 69-70.

Thus, with the debate between these two early management writers, each of whom based his contentions on his experiences in actual business organizations, the concept of unity of command was brought to the attention of management scholars. Similar debates seem to exist still among management scholars.

It would be difficult to contend that either of these theories has replaced the other in management literature. Functional foremanship does not seem to be followed in present day organizations, at least in the form recommended by Taylor. In fact, functional foremanship was never used extensively in industrial practice. In 1915 a study was conducted for the United States Commission on Industrial Relations in an attempt to discover the extent to which Taylor's ideas of scientific management were being utilized in industry. In the study of thirty-five shops which were considered to be managed by Taylor's concept of scientific management, it was found that relatively few employed the full system of functional foremanship. It was reported that some had installed it and later returned to the old military system while others had never seriously attempted its installation. It was reported, however, that some of the shops had reorganized by taking off some of the duties previously assigned to foremen and assigning them to other functionaries.⁷

⁷Robert Franklin Hoxie, Scientific Management and Labor (New York: D. Appleton and Company, 1915), p. 31.

One point of interest is the meaning of Fayol's statement about retaining unity of command "until things change". This could mean until organizations change, or until management theory is improved or a number of things. Fayol himself said that his principles of management should not be considered to be iron clad laws and that they should not be considered rigid or absolute in management affairs. He pointed out that principles should be flexible and capable of adaptation to every need.⁸ With this in mind, the question is raised whether the principle of unity of command should be adapted to fit organizational theory for complex organizations of today. Fayol further pointed out that the use of principles is an art requiring intelligence, experience, decision and proportion.⁹

Perhaps some individuals today are guilty of trying to utilize principles of management as rigid laws rather than useful generalizations. On the other hand, if generalizations are to be useful guides to decision and action, they must be applicable to organizational problems.

Recent and Current Definitions of Unity of Command

Many of the definitions of the principle of unity of command which have been offered by current and recent writers

⁸Fayol, op. cit., p. 19.

⁹Ibid.

seem to be mainly a reflection of the definition stated by Fayol. He defined unity of command with these words, "For any action whatsoever, an employee should receive orders from one superior only".¹⁰ This definition leaves some question about the meaning. A worker may be involved in several actions. Hence, if a worker's responsibilities include several actions he might conceivably, by this definition, have several supervisors. This was the contention of F. W. Taylor with his idea of functional foremanship. So, the simplest interpretation of Fayol's definition would allow one to assume that he felt multiple foremanship over different activities was acceptable within the confines of his definition. However, in light of Fayol's other writings and his strong challenge of Taylor's idea of functional foremanship, it is apparent that Fayol considered a single boss to be essential to preserve unity of command.

Other definitions of unity of command appear to allow the possibility of more than one superior so long as these supervisors are in charge of different phases or activities of the work of the subordinate. Filipetti defined unity of command as, "Unity of command requires that an employee receive instructions about a particular operation from one man".¹¹ This definition seems to allow different supervisors

¹⁰Ibid., p. 24.

¹¹George Filipetti, Industrial Management in Transition (Chicago: Richard D. Irwin, Inc., 1946), p. 159.

so long as these supervisors are concerned with different operations. But Filipetti, like Fayol, quickly dropped the possibility by saying, ". . . no more than one person should exercise authority over the same man".¹²

Some other representative definitions of the principle, many of which are paraphrasing of Fayol's, include these:

. . . the delegation of authority flows from a single superior to a single subordinate and each subordinate reports to only one superior. That is, he is accountable only to the superior from whom he receives his authority and to no one else. This is what is known as unity of command.¹³

Unity of command. This means that employees should receive orders from one superior only.¹⁴

. . . there should be a clear chain of command and unity of command--each person should take orders from only one superior and be accountable only to him.¹⁵

Principle of Unity of Order Giving: For maximum effectiveness, orders concerning a particular operation should be received directly from one person only.¹⁶

¹²Ibid.

¹³Theo Haimann and William G. Scott, Management in the Modern Organization (Boston: Houghton Mifflin Company, 1970), p. 196.

¹⁴Harold Koontz and Cyril O'Donnell, Principles of Management, 4th ed. (New York: McGraw-Hill Book Company, 1968), p. 24.

¹⁵Alan C. Filley and Robert J. House, Managerial Process and Organizational Behavior (Glenview, Illinois: Scott, Foresman and Company, 1969), p. 72.

¹⁶George R. Terry, Principles of Management, 5th ed. (Homewood, Illinois: Richard D. Irwin, Inc., 1968), p. 485.

. . . no member of an organization should report to more than one superior on any single function. In other words, a foreman may report to his line superior on output and efficiency, at the same time accepting the authority of production control on scheduling. This way of stating the principle is more realistic.¹⁷

Unity of command: Each person should be accountable to only one superior.¹⁸

The concept of unity of command holds that no individual should be subject to the direct command of more than one superior at any given time.¹⁹

Unity of command. One of the traditional principles of organization, generally referred to as unity of command, states that no member of an organization should report to more than one superior on any single function.²⁰

At each level there are evidences of unity of command, meaning that subordinates formally report to only one boss.²¹

The principle may be stated as follows: a workman subject to orders from several superiors will be confused, inefficient, and irresponsible; a workman subject to orders

¹⁷W. Warren Haynes and Joseph L. Massie, Management: Analysis, Concepts and Cases (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961), p. 40.

¹⁸Ernest Dale, Management: Theory and Practice (New York: McGraw-Hill Book Company, 1969), p. 189.

¹⁹Justin G. Longenecker, Principles of Management and Organizational Behavior, 2nd ed. (Columbus, Ohio: Charles E. Merrill Publishing Company, 1969), p. 200.

²⁰Joseph L. Massie, Essentials of Management (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), p. 47.

²¹John M. Pfiffner, and Frank P. Sherwood, Administrative Organization (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1960), p. 135.

from but one superior may be methodical, efficient, and responsible. Unity of command thus refers to those who are commanded, not to those who issue the commands.²²

The unity of command principle states something we all know well--no man can serve two masters well. The expression, unity of command, stresses that the sources of command should be unified so that a subordinate receives assigned duties and authority from one superior and is accountable only to that superior.²³

No executive or employee, occupying a single position in the organization, should be subject to definite orders from more than one source.²⁴

Each of these definitions seem to have a familiar tone in that each is based on Fayol's definition to some extent. But each does seem to have a slightly different emphasis or approach to defining the principle of unity of command. All support the idea that commands should be unified in purpose. However, there does seem to be some difference in emphasis on the question of whether functional reporting is allowed within the confines of the principle. Some definitions patently advocate the one boss idea, while others leave an opening to the suggestion that unity of command may be preserved under a system of more than one

²²Luther Gulick and Lyndall F. Urwick, Papers on the Science of Administration (New York: Columbia University Press, 1937), p. 9.

²³Henry L. Sisk, Principles of Management (Cincinnati, Ohio: South-Western Publishing Company, 1969), p. 318.

²⁴Carl Heyel, ed., The Encyclopedia of Management, Vol. I, (New York: Reinhold Publishing Corporation, 1963), p. 620.

immediate superior so long as the areas of authority are not overlapping. The last definition quoted above is one of the more interesting definitions. This definition was formulated by M. R. Rorty, who was once vice president of International Telephone and Telegraph and later president of the American Management Association. It was published by the American Management Association under the title of Ten Commandments of Good Organization. This definition seems to suggest the possibility that it is permissible for an individual to occupy more than one position in an organization, and that unity of command may be retained by having only one superior over each of these organizational positions.

One last definition is offered which has another emphasis. Simon has stated this definition:

In case two authoritative commands conflict, there should be a single determinate person whom the subordinate is expected to obey: and the sanctions of authority should be applied against the subordinate only to enforce his obedience to that one person.²⁵

While this definition may be more acceptable in light of modern complex organizations, than the oversimplified one boss idea, it too leaves some unsolved problems. It does not indicate a method for determining which superior

²⁵Herbert A. Simon, Administrative Behavior, 2nd ed., (New York: The Free Press, 1965), p. 25.

is to have authority in case of a conflict. But it is at least an attempt to state the principle in a more realistic manner.

Adopted Definition for This Study

The definition of unity of command which has been adopted for this dissertation is stated in a more liberal fashion than perhaps any of the definitions noted above. It is possible that any number of directives from any number of superiors may be unified in purpose. It is suggested that children who receive conflict in directives from their two parents are subject to disunity of command, while children who receive coordinated directives from their two parents are receiving unified commands. It is generally advocated that the parents coordinate and unify their directives to children, but it is not recommended that a child should have only one parent to avoid disunity of command. Therefore, why should the principle be different in organizational theory? It is suggested that unification of command results from the coordination and unification of purpose and activity which is prescribed rather than from the number of superiors, in spite of the popular statement of the concept.

The following definitions are therefore adopted for this study:

Unity of Command: A command situation in which an employee receives one set of consistent commands from a

single superior, or two or more unified, consistent and coordinated commands from two or more superiors. The essence of unity of command by this definition is in the unification of the commands rather than the number of superiors who may issue those commands.

Disunity of Command: A command situation in which an employee receives two or more sets of commands from one or more superiors which are conflicting, inconsistent and uncoordinated in terms of the achievement of a common goal or purpose. The essence of disunity of command is in the fact that the subordinate receives conflicting directives relative to the task or accomplishment of the purpose of the organization.

Negative Effects

Why do writers advocate adherence to the principle of unity of command? In general it is because of the negative effects which its violation is claimed to have on the organization. Many of these negative effects are claimed only as potentialities and probabilities of ill effects which will presumably occur. Perhaps most of the reasons for adhering to the principle of unity of command that are held today are directly related to the contentions of Fayol when he said that violation of the principle wrecks havoc in the concern. Fayol compared the results of violation of the principle of unity of command to an animal organism troubled by a foreign body. He felt that the foreign body must be

removed or the organism would wither away.²⁶ More specifically, Fayol contended that violating the principle results in undermined authority, poor discipline, disturbance of order and threatened stability.²⁷

Longenecker pointed out that when unity of command is violated, "It becomes difficult, if not impossible, to hold the subordinate accountable. The mere fact of multiple supervision has provided him with a ready-made alibi".²⁸

Gulick and Urwick, in their definition of unity of command, contended that the negative effects of violating it are these: the worker is confused, inefficient and irresponsible.²⁹ Sisk did not say exactly what the negative effects of violation of unity of command are, but referred generally to its potential dangers.³⁰ Filipetti reflected that violation of unity of command results in weakened authority, poor discipline and confusion.³¹

These and similar dangers have been claimed as the negative effects that can be expected if unity of command is not observed. It is significant that none of these writers has predicted that the negative effects of violation

²⁶Fayol, op. cit., p. 24.

²⁷Ibid.

²⁸Longenecker, op. cit., p. 201.

²⁹Gulick and Urwick, op. cit., p. 9.

³⁰Sisk, op. cit., p. 320.

³¹Filipetti, op. cit., p. 159

of the principle of unity of command is reduced productivity and performance. Gulick and Urwick perhaps come closest to it when they pointed out that the worker would be inefficient when the principle is violated.

It is also significant that these writers' contentions of the negative effects of violation of unity of command are "a priori". That is, they seem to regard these dangers and negative effects as self evident.

Organizational Influences of Unity of Command

The concept of unity of command has significantly influenced the organizational structures of enterprises. Some of these influences are discussed in the following paragraphs.

Pyramidal Organizational Form

In recognition of the single superior aspect of unity of command, organizational structures have almost universally assumed the basic pyramidal shape. This is based on the idea that a subordinate may have only one immediate superior, while the superior may have a number of subordinates. It is apparent that if the opposite were the case, that is if a subordinate had a number of superiors, the basic organizational shape might be radically changed. This change might possibly take on the shape of an inverted pyramid. Hence, the pyramidal shaped organizational structure appears to be a result of the widespread belief in the popular concepts of the principle of unity of command.

Chain of Command

Also, the chain of command, which is so prominent in management literature, is probably a result of the concept of unity of command. Classical organizational theory has advocated a chain of command, or a chain of communication, from the top to the bottom of the organization. Beishline has observed that unity of command is of particular importance in military organization, ". . . because of the military chain of command".³² Hence, it is suggested that the chain of command is preserved in recognition of the principle of unity of command, and that the chain of command is considered essential to preserve the integrity of unity of command.

Centralization of Service Departments

Another organizational effect which may be attributed, in part at least, to the concept of unity of command is the tendency toward the centralization of some service departments. Organizational specialists who provide services for various parts of the organization are frequently placed in a centralized department to work under the direction of its supervisor. This may be because of a belief in the single supervisor concept. If such a specialist belonged to several organizational units, the one boss idea of unity of command would be dishonored.

³²John Robert Beishline, Military Management for National Defense (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1950), pp. 89-90.

Victor A. Thompson contended that the idea of plural organizational unit membership is prohibited because of the institution of hierarchy. He observed that, "The hierarchial institution is monocratic".³³ He also theorized that this monocratic system gives the superior the right to be the only person to deal with the subordinate and tell him what to do. Furthermore, he observed that our belief in this hierarchial system forces us, as best we can, to fit a job completely into a single organizational unit, and then he suggested that many jobs should be placed in more than one organizational unit.³⁴

The hierarchial implications of unity of command are also mentioned by Carzo and Yanouzas when they observed, "Unity of command forms the basis, therefore, for the hierarchy of authority because it defines the path of authority which extends from the top to the bottom of the formal organization".³⁵

Theory of Line and Staff

Almost all management textbooks discuss the subject of line and staff in organizations. While there is some disagreement among theorists about the distinctions between

³³Victor A. Thompson, Modern Organization (New York: Alfred A. Knopf, 1961), p. 104.

³⁴Ibid., p. 38.

³⁵Rocco Carzo Jr., and John N. Yanouzas, Formal Organization: A Systems Approach (Homewood, Illinois: Richard D. Irwin, Inc., 1967), pp. 43-44.

line and staff, it seems that the theory of line and staff recognizes the need for unity of command, while at the same time it provides for specialists in the organization.

Ralph C. Davis, while somewhat silent on the subject of unity of command in his book, The Fundamentals of Top Management, indicated that the theory of line and staff recognizes the importance of unity of command.³⁶

Albers said, "A number of solutions have been given to the unity of command problem. An oft-used arrangement is the line-staff system that retains many of the advantages of functional specialization without violating unity of command. Under such a system, functional departments and executives perform activities in a staff relationship to the operating departments".³⁷

Ernest Dale also prescribed line and staff as an organizational technique to coordinate the need for unity of command with the need for specialization. He wrote:

The line staff organization is dictated by the scalar principle and the principle of unity of command; otherwise, it would be difficult to observe both in a company that had many specialists of different types. Under Frederick Taylor's functional-foremanship plan, each of the functional foremen was a specialist in some phase of the work and each gave orders directly to the workmen. This meant that there could be no unity of command and no single line of authority running from the

³⁶Ralph Currier Davis, The Fundamentals of Top Management (New York: Harper and Row, Publishers, 1951), p. 432.

³⁷Henry H. Albers, Principles of Management (New York: John Wiley and Sons, Inc., 1969), p. 135.

top to each person in the organization; hence the danger of conflicting orders existed. Division of the jobs into line and staff activities gets around this difficulty.³⁸

Sisk has suggested that the difficulties of line and staff organization may be minimized by clearly defining functional authority when he wrote:

The potential difficulties resulting from the dual authority sources of line and staff are minimized when the functional authority of staff is clearly defined and it is emphasized that even though staff properly has authority within a given functional area, any direct orders are to be issued only by the immediate line superior.³⁹

Whatever the merits or demerits of the line and staff organization might be, it does seem significant that unity of command has influenced its emergence as a prominent organizational theory. Without the widespread belief in unity of command, line and staff might have never come to its present position in organizational theory.

Instances of Plural Command in Organizations

In business organizations there are many possibilities in which employees might be in a subordinated position to plural commanders. Hence, one might assume that these organizations did not preserve unity of command when these situations arise. This would, of course, be a valid assumption under the assumption that any dual command is a

³⁸Dale, op. cit., p. 196.

³⁹Sisk, op. cit., p. 320.

violation of unity of command. Some of the possible situations that might result in dual command in organizations which are discussed in the following paragraphs, are as follows:

1. Undifferentiated organizations.
2. By-passing in the chain of command.
3. Staff relationships.
4. Assignment to multiple organizational units.
5. Office of the President.
6. Board of Directors.
7. Functional foremen.
8. Matrix organizational structure.

Undifferentiated Organizations

This is a situation in which the employee cannot definitely identify his superior. It occurs most frequently in the case of very small enterprises. The employee merely carries out whatever activities are assigned to him by anyone who appears to have authority over him. This could possibly occur in a firm which has not reached a size sufficient to see the need to departmentalize its operations. This kind of dual command might very likely result in a genuine violation of unity of command in that there is no basis for the unification of any set of commands to be given to the employee.

By-Passing in the Chain of Command

Dual command may occur when a manager by-passes another manager in the chain of command and issues directives directly to subordinates two or more echelons below him. This might be done either by organizational policy or as an

immediate personal decision by the manager. The chain of command in some organizations may be so long that communication and decision making may be unduly slow, and the incidence of by-passing may be common. Pfiffner pointed out that large organizations must provide communication lines shorter than the chain of command, but should be careful not to violate the spirit of unity of command.⁴⁰

Ernest Dale contended that strict observation of the principle of unity of command necessarily eliminates by-passing in the chain of command.⁴¹ Newman, Summer and Warren condemned the idea of by-passing in the line of supervision. They pointed out that by-passing puts the subordinate in an awkward position; he can scarcely refuse the command and may be flattered to work for a higher echelon. On the other hand, the by-passed executive feels distressed and loses status and influence.⁴²

Contrary to these contentions, Drucker contended that going through channels rather than going directly to the man who has the ideas or to the man with the information is an indication of poor organization. He said, "'Going

⁴⁰John M. Pfiffner, The Supervision of Personnel (New York: Prentice-Hall, Inc., 1951), p. 44.

⁴¹Dale, op. cit., p. 189.

⁴²William H. Newman, Charles E. Summer and E. Kirby Warren, The Process of Management (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), p. 91.

through channels' is not just a symptom of malorganization; it is a cause".⁴³

Fayol himself recognized the need to shorten the chain of command. He suggested that a "gangplank" or as some say a "bridge" could be thrown across from one chain of command to another chain of command, making it possible for subordinates to deal with each other, under proper authorization from their respective superiors, and only inform their respective superiors of any action taken.⁴⁴

Staff Relationships

Another organizational situation which may result in plural command is that of the staff relationship. Staff specialization was introduced to organizational theory for the purpose of providing the advantages of specialization while at the same time preserving unity of command. The theory holds, in general, that direct orders and commands are issued by line executives while specialized functional guidance or assistance is provided by staff executives. This may result in plural command but need not result in disunity of command. Disunity of command need not result unless the line executives and staff specialists are failing to coordinate their directives toward the accomplishment of common objectives.

⁴³Peter F. Drucker, The Practice of Management (New York: Harper and Row, Publishers, 1954), p. 225.

⁴⁴Fayol, op. cit., pp. 35-36.

In speaking of staff relationships Sisk commented, "The exercise of strong functional authority may result in situations that violate the unity of command principle".⁴⁵ Another writer offered this advice for the use of staff specialists without creating disunity of command, "Specialists are necessary, but they should be on tap--not on top".⁴⁶

Hence, although there may be some disagreement on the matter, it appears that dual command may be among the effects of line-staff organizational structure, but disunity of command need not necessarily emerge as a result of it.

Assignment To Multiple Organizational Units

There may be instances in which an individual may be a member of more than one organizational unit and thus come under the command and authority of the manager of each department. This might be observed in situations in which a functional specialist was assigned to work part time for a number of departments. His time could possibly be divided among the departments on some appropriate time allocation basis. As was noted previously, Thompson indicated that plural organizational unit membership is often prohibited because it violates the institution of hierarchy.⁴⁷ Koontz

⁴⁵Sisk, op. cit., p. 320.

⁴⁶Henry H. Farquhar, "The Anomaly of Functional Authority at the Top," Advanced Management, Vol. VII, No. 2, April-June, 1942, p. 51.

⁴⁷Thompson, op. cit., p. 104.

and O'Donnell commented that, ". . . multiple subordination tends to cause confusion, undermine the definiteness and effectiveness of authority, and threaten organizational stability".⁴⁸

Longenecker, in his definition of unity of command, implied that an employee might be a member of multiple organizational units so long as he was not subject to the direct command of more than one superior at any given time.⁴⁹ In addition to this he further observed:

It is possible that some duality in command does not necessarily result in conflicting orders. A more flexible view of unity of command holds that a single manager should be responsible for resolving conflicting orders and that sanctions should be employed to enforce obedience to only one superior.⁵⁰

Office of the President

Another phenomenon of company departures from the one boss idea is found in multiple presidencies. McFarland said, "General Electric, Pet, Inc., and the Mead Corporation have adopted 'offices of the President', consisting of three, four or even seven executives acting together to fulfill the presidential functions".⁵¹

⁴⁸Koontz and O'Donnell, op. cit., p. 411.

⁴⁹Longenecker, op. cit., p. 200.

⁵⁰Ibid., pp. 201-202.

⁵¹Dalton E. McFarland, Management: Principles and Practices (New York: The Macmillan Company, 1970), p. 430.

This could be thought of as a violation of the principle of unity of command if rigidly applied. However, companies of this stature would not establish a system that would lead to the negative effects which have been claimed for violation of unity of command.

Board of Directors

A president of a corporation takes his directives from the board, and the board is a group. Of course the president is frequently a member of the board and participates in the decisions which the board makes, but nevertheless he is still under the authority and directives of the several members of the board. Hence, this could be viewed as a violation of the principle of unity of command.

Haynes and Massie said of the board as a system of plural command:

In some cases the president may look upon the chairman as his superior, but more commonly he thinks of himself as reporting to the entire board. The principle of unity of command, as usually stated, would imply that this arrangement is unsound; yet the widespread use of this organizational pattern suggests that it is workable.⁵²

Functional Foremen

Although possibly somewhat rare in industry and organizations today, another form of dual command results

⁵²W. Warren Haynes and Joseph L. Massie, Management: Analysis, Concepts and Cases (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961), p. 40.

from functional foremanship. This was advocated by Frederick Taylor as a system to give the specialization which he felt to be so essential in the industrial organization. This results in each worker being subjected to directives from each functional foreman with regard to his specialized functional area. Whether this results in violation of unity of command is dependent on several factors. Among these factors are whether the functional foremen are properly coordinated and whether their functional areas are properly distinguished and differentiated. It may also depend on whether the functional foremen are cooperative.

However, some writers are more definitive in their positions on this question. For instance Haimann and Scott stated quite definitely, "There is no doubt that functional authority violates the principle of unity of command".⁵³

On the other side of the coin Albers asserted:

Organizational practice indicates that a significant amount of functional decision making can occur without disrupting unity of command. The use of coordination centers at each level of the management hierarchy seems to provide an important safeguard against the difficulties that sometimes accompany functionally differentiated decision making.⁵⁴

Matrix Organizational Structure

Although the title Matrix Organizational Structure is perhaps new, the concept is not necessarily new. It may

⁵³Haimann and Scott, op. cit., p. 232.

⁵⁴Alberts, op. cit., p. 175.

resemble functional foremanship and the concept of multiple organizational unit membership combined. The matrix organization (sometimes called project organization) usually involves departments set up to accomplish a particular objective--often under special contract such as a government contract. The project has a special manager who fills his manpower needs from other existing departments, usually on a temporary basis. After the completion of the project the personnel are probably returned to their respective departments.

This might also be organized in such a way that the project manager utilizes the services of existing departments to process or service his project or hardware or whatever. The worker may find his general work assignment is given him by his immediate departmental superior while he is also accountable to one or more project managers for the work relating to their particular projects.

In evaluation and appraisal of this form of organization, Scott alleged:

The similarity between the matrix organization and the functional organization is clear. For one thing, the unity of command principle is violated. Each engineer, scientist, and technician has two bosses--his administrative head and his project manager.⁵⁵

⁵⁵William G. Scott, Organization Theory: A Behavioral Analysis for Management (Homewood, Illinois: Richard D. Irwin, Inc., 1967), p. 132.

Once again, this may very well be an organizational instance of plural command. As has been previously suggested, the presence of two or more bosses does not necessarily result in violation of unity of command, so long as these managers are coordinated toward a mutually desired and understood objective.

Recent Criticism of Classical Principles

In recent years the classical principles of organizational theory have been subjected to a good deal of challenge. Much of this has come from the behavioral scientists, although it has been subjected to challenge from others as well.

Unity of command has been referred to as "one of the most sacred classical principles".⁵⁶ One might assume that if this is the most sacred of the classical principles, then it surely would be the easiest principle to defend from possible attacks. This may or may not be the case however, because there seems to be a good deal of criticism of unity of command by those who are hostile to it as well as those who are more friendly to the principle. Yet, it is observed that some of the criticism that has been directed toward unity of command has been based on "a priori" and deductive reasoning--a criticism often directed toward the classical principles themselves.

⁵⁶Ibid., p. 116.

Violation in Actual Practice

Some of the criticism of unity of command has been based on the contention that it is violated in actual organizations so frequently with less than disastrous results. The validity of this contention is determined by the definition of unity of command. If it is rigidly defined in the classical sense, i.e., the one boss idea, then there are admittedly many violations of it. In the preceding section of this paper, cases of plural command were discussed.

Although Fayol was quite definite that unity of command should be observed in organizations, he acknowledged that in practice unity of command had been violated with a degree of success. He wrote:

I do not think that a shop can be well run in flagrant violation of this (unity of command). Nevertheless, Taylor successfully managed large-scale concerns. . . . I imagine that in practice Taylor was able to reconcile functionalism with the principle of unity of command, but that is a supposition whose accuracy I am not in a position to verify.⁵⁷

Chris Argyris, a well known behavioral scientist, suggested that actual cases of ignoring formal principles of organization detracts from their validity. He contended:

Clearly, no company actually uses the formal principles of organization exactly as stated by their creators. There is ample evidence to suggest that they are being modified constantly

⁵⁷Fayol, op. cit., p. 22.

in actual situations. However, those who expound these principles would probably be willing to defend their position that this is the reason that human relations problems exist; the principles are not followed as they should be.⁵⁸

Scott wrote on this subject that, "There are numerous examples of how giantism and technological advancement have in concrete circumstances made a mockery of unity of command, idealized line-staff relationships, and close supervision".⁵⁹

No doubt, there are instances in actual practice that would cast doubt on the essentiality of unity of command and possibly other classical principles of organization. But it must be remembered that organizational theorists have prescribed what they considered to be correct practice, rather than describe actual practice. So, the question of whether instances of at least seeming successful violation of unity of command renders it invalid is perhaps academic. Massie seems to provide some useful guidelines to the practical use of the principle of unity of command in these words:

The principle of unity of command may be useful in the planning of an organization if it is interpreted as a tendency toward the simplification of relationships between superior and subordinate; it is not realistic if it is interpreted as an immutable law that

⁵⁸Chris Argyris, Personality and Organization (New York: Harper and Brothers, 1957), p. 67.

⁵⁹Scott, op. cit., p. 118.

would eliminate useful relationships among executives.⁶⁰

In another work Massie said that if unity of command is to be viewed as a principle of management it requires a number of qualifications. But he added that as qualifications are added, its usefulness in application becomes more restricted. Of the neoclassical view of unity of command he said, "Therefore, the neoclassical tends to view unity of command as a useful concept to be qualified by many factors appearing in actual situations".⁶¹

Authority As A Basis of Organization Theory

A number of management scholars have indicated that organization theory has been based on the concept of authority. Some have challenged the validity of using this as a basis of organizational theory for modern day organizations. Peter Drucker is one of these. He suggested that modern day organizational precepts are obsolete because they are mere variations of organizational concepts of fighting forces in China, Egypt and Greece of thousands of years ago.⁶² Of the application of these precepts to modern organizational theory he commented:

⁶⁰Joseph L. Massie, Essentials of Management (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), pp. 47-48.

⁶¹Joseph L. Massie, "Management Theory," Handbook of Organizations, ed. by James G. March (Chicago: Rand McNally and Company, 1965), p. 397.

⁶²Peter F. Drucker, "Managing the Educated," Management's Mission In A New Society, ed. by Dan H. Fenn (New York: McGraw-Hill Book Company, 1959), p. 174.

When we began to build large scale business organizations some 75 years or so ago, we simply took the prevailing concepts of military organization and adapted them. The principle of such an organization was authority, and the basic problem was to make responsibility commensurate with authority. To this day, the relationship of authority to responsibility is central to our concept of organization.

For the new organization of highly educated people, authority and responsibility may well be the wrong principles of organization. It may well be that we will have to learn to organize not a system of authority and responsibility--a system of command--but an information and decision system--a system of judgment, knowledge, and expectations.⁶³

It is important to observe that Drucker is commenting about the organizational problems in which employees are of a high caliber--one in which the employees are highly educated. His basic point is that since a large percentage of present day employees are highly educated, organizational theory must be modernized to take this factor into account.

Dale Yoder is another writer who challenged the use of authority as a basis of organizational theory. He suggested that present day organizational theory is based on early authoritarian concepts. He further contended that authority delegation through the chain of command has been the principal means by which coordination has been traditionally obtained.⁶⁴ In evaluation of the use of early organizational

⁶³Ibid.

⁶⁴Dale Yoder, Personnel Management and Industrial Relations, 5th ed., (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962), p. 82.

theories in modern organizations he wrote:

Earlier theories could scarcely be expected to fit the social and political philosophies of modern society. Two World Wars expressed growing popular resentment toward political authoritarianism. Growing interest in political democracy created questions about authority, status and participation in working organizations. Popular discussions raised the question whether free men and women could be first class citizens in the community while they were second class citizens in their work.⁶⁵

Hence, these writers have challenged the use of authority as a basis for organizing. Some would recommend organizing on the basis of a cooperative system of communication. It appears that the classical theorists could easily accept this concept, because all management theorists have been concerned with a system to achieve desired objectives.

Behavioral Evaluations of Classical Principles

A number of recent theories have been offered which have cast a good deal of doubt on the value of the classical principles of organizations. A few of these are discussed in the following paragraphs.

Chris Argyris in his book Personality and Organization has concluded that the formal organizational principles as they have been utilized have produced ". . . basic incongruencies between the growth trends of a healthy personality

⁶⁵Ibid., p. 85.

and the requirements of the formal organization".⁶⁶ He further asserted:

If the principles of formal organization are used as ideally defined, employees will tend to work in an environment where (1) they are provided minimal control over their workaday world, (2) they are expected to be passive, dependent, and subordinate, (3) they are expected to have a short time perspective, (4) they are induced to perfect and value the frequent use of a few skin surface shallow abilities and, (5) they are expected to produce under conditions leading to psychological failure.⁶⁷

Perhaps the one boss concept of unity of command is one of these principles that produces these ill effects when utilized as ideally defined. The definitions of unity of command which were reiterated in this paper certainly do seem to continue to define unity of command in this ideal fashion. Perhaps this is an indication that a new, more workable definition of unity of command is needed.

Herbert Simon has characterized the formal organizational principles as "proverbs and essentially useless".⁶⁸ This is one of the most poignant criticisms of classical organizational theory. However, it might be observed that a proverb is based on truth. If there is truth in the classical principles, then it is unlikely that they are useless.

⁶⁶Argyris, op. cit., p. 66.

⁶⁷Ibid.

⁶⁸Herbert Simon, Administrative Behavior, 2nd ed., (New York: The Free Press, 1965), pp. xxxiii-xxxiv.

Another critic of classical organizational principles, Douglas McGregor, contended that the classical principles are based on a negative theory of human nature. He called this Theory X, which he claimed is based on these beliefs:

1. The average human being has an inherent dislike of work. . .
2. Because of this. . .dislike of work, most people must be coerced, controlled, directed, threatened with punishment to get them to put forth adequate effort toward the achievement of organizational objectives.
3. The average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition, wants security above all. . .⁶⁹

McGregor then proceeded to contrast this with what he calls Theory Y, which he suggested is a more positive assumption about human nature. He indicated a need to create organizational relationships based on the assumptions of Theory Y as opposed to Theory X. He stated that, "Authority is an inappropriate means for obtaining commitment to objectives. . ."⁷⁰

These and other behavioral scientists have been somewhat critical of classical organizational principles. They are cited for the purpose of indicating that there is much that still needs to be done in the testing and evaluating of these principles.

⁶⁹Douglas McGregor, The Human Side of Enterprise (New York: McGraw-Hill Book Company, Inc., 1960), pp. 33-44.

⁷⁰Ibid., p. 56.

Summary

The purpose of this chapter has been to critically review some of the literature which is pertinent to the subject of the principle of unity of command. While, in one sense, much has been written about the principle, in another sense relatively little has been written. Much of what has been written has been merely a reflection of the very earliest declarations of its meaning and significance. Some disagreement has been introduced into the literature relative to its value.

It is the purpose of this study to assist in the clarification of the principle of unity of command. The conduct of the experiments described were undertaken for this purpose.

CHAPTER III

EXPERIMENTAL DESIGN

Before the experiments are described, it is desirable to review some of the basic aspects of the process of laboratory experimentation. Most definitions of laboratory experiments emphasize the importance of such aspects as the simulation of the independent variable, control of extraneous variables and precise measurement of the dependent variable. Zelditch and Evan drew a rather descriptive picture of this operation when they stated that through laboratory experimentation:

. . . such processes (as occur in the real world) may be simplified, measured, and manipulated, so that rare states may be created, reasonably exact replicates ensured, necessary contrasts obtained, confounding factors randomized, extraneous disturbances eliminated, and the processes observed comprehensively, precisely, and more or less at the will of the investigator.¹

Weick stated that the most important feature of laboratory experiments is that they use controls to identify sources of variation.² These controls are for the purpose of ensuring that the only variation between treatments of

¹M. Zelditch and W. M. Evan, "Simulated Bureaucracies: A Methodological Analysis," Simulation in Social Science: Readings, ed. by H. Guetzkow (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962), p. 49.

²Karl E. Weick, "Laboratory Experimentation With Organizations," Handbook of Organizations, ed. by James G. March (Chicago: Rand McNally and Company, 1965), p. 198.

the two groups, whose behavioral responses are being investigated, is the independent variable. The laboratory is defined as any setting in which the experimenter is able to control the conditions under which he makes his observations.

In discussing the important aspects of laboratory experimentation, Underwood stated:

If you want basic principles for designing research problems they can be given rather simply; rather 'it' can be given rather easily. For there is only one basic principle, namely, design the experiment so that the effects of the independent variables can be evaluated unambiguously.³

General Description of Experiments

Three experiments were conducted. In two of the experiments the subjects were divided into two groups at random. In one of the experiments an existing division of subjects was utilized. In each experiment one group was established as a control group and one other as an experimental group. Both groups were equalized insofar as possible for the conditions. The independent variable in all experiments was the presence of unity of command for the control group and disunity of command for the experimental group. The production of the subjects on each experiment was the dependent variable. A morale scale was utilized to determine any possible differences in morale or attitude

³Benton J. Underwood, Psychological Research (New York: Appleton-Century-Crofts, Inc., 1957), pp. 85-86.

between the two groups in each experiment. The details of the morale scale are discussed after the experiments have been described.

The t test was used to determine the significance of any statistical difference in the two groups. It was decided before the data was collected to accept as significant any difference at the .05 level.

Experiment I: The Porthole Assembly Experiment
(Visual Instructions)

Subjects

In this experiment a total of one hundred students enrolled in various business classes were utilized as subjects. The problem was administered to these subjects in three different sessions. During the first session, a class composed of 45 students was utilized. Two other sessions of the experiment were held a few days later, in which volunteer students from several other classes were used as subjects. No student was used as a subject more than once. In each of the three sessions, the subjects were randomly assigned to either an experimental or a control group.

Although the problem was administered to a total of 100 subjects, there were 49 subjects in the control group and 51 subjects in the experimental group due to an administrative error. One morale scale which was completed by a subject in the control group was lost, so one subject's

score on performance in the control group was randomly omitted, making 48 subjects in the control group. Since it was desired to have the same number of subjects in each group, three subjects' production scores and morale scales were randomly omitted from the experimental group. Thus, there were 48 subjects in each group for measurement and evaluation purposes.

The Task

In this experiment the two groups were tested separately. This was necessary because of the design of the experiment. Subjects were shown two large illustrations of an apparatus, called a porthole assembly, which could be constructed from index cards held together with staples (See Appendix A). The illustrations were exposed to the view of the subjects for 20 seconds, after which subjects were instructed to assemble as many of the portholes as they could in an assembly time of 10 minutes. All the portholes were to be constructed exactly like the one shown in the illustrations. No questions or comments were allowed during the viewing of the illustrations or during the assembly period.

For the control group, the two illustrations which were exposed to the view of the subjects were exactly alike. For this group the porthole illustrated was composed of a base section containing three 4 X 6 index cards stapled together in a triangular manner. The upper portion was

composed of four 3 X 5 index cards assembled in a box like fashion and attached to the base section of the porthole. This set of illustrations simulated identical or unified commands given to the subjects relative to the structural features of the porthole in the form of visual instructions.

For the experimental group, one illustration was the same as those viewed by the control group, while the other illustration viewed had three instead of four cards forming the upper portion of the porthole. In addition to this difference, the lined sides of the index cards were placed on the opposite side of the porthole assembly. These two illustrations were exposed to the view of the subjects for the same time of 20 seconds provided to the control group. The subjects were then allowed an identical 10 minute period to construct as many of the portholes as they could. The set of two different illustrations simulated giving disunified commands to the subjects relative to the structural aspects of the porthole.

In summary, the control group was subjected to two visual unified commands by their seeing two identical illustrations. The experimental group was subjected to two visual disunified commands by their seeing two dissimilar illustrations.

Controls

To ensure that the only variable present was the independent variable, care was taken to ensure that a

minimum of extraneous factors could affect the results.

In this experiment some of the controls involved:

1. The subjects were divided into two groups at random. This was intended to ensure that no experimenter bias entered into the division of subjects. Since subjects were randomly assigned to the groups, any difference in the characteristics or abilities of the two groups was presumedly determined by chance and not by the experimenter.
2. The environment was held relatively constant in that each group was tested in the same room within a short time interval. This assured equalization of such factors as heat, ventilation, lighting and general comfort of the room. Subjects used identical equipment and materials. The same person administered the problem to each group.
3. The purpose of the experiment was not revealed to the subjects. This was to prevent any possibility of the subjects consciously or unconsciously reacting or behaving in the way they thought they were expected to or should. It also assured that subjects who might wish to confuse the results would find it difficult to do so since they would not know the purpose of the experiment.

4. To eliminate or offset any tendency of subjects in the experimental group being influenced by favoring visual images on the right or the left, one half of the subjects in the experimental group saw image 1 on the right while the other half saw image 1 on the left.

Measurement

The administrator evaluated each subject's production by counting the number of completed portholes. The porthole was considered acceptable if it consisted of a base which was constructed from three 4 X 6 cards and an upper portion constructed of 3 X 5 index cards, and was considered acceptable regardless of the number of cards which composed the upper portion of the assembly. In general the measured output of portholes was determined as uniformly as possible for both groups.

Such exacting standards as the placement and number of staples on the portholes, whether lined sides of the index cards were inside or outside of the assembly and the exact position of the upper portion relative to the lower portion of the porthole were disregarded for both groups. The subjects were not aware of the specifications for evaluation of the portholes.

Equipment and Materials

All subjects were supplied with a generous supply of 3 X 5 and 4 X 6 index cards, a stapler and a box of staples. The staplers were not loaded with staples at the beginning of the experiment. Since it was felt that most subjects would need to reload the stapler during the construction period, written instructions were given for loading the stapler and the administrator gave a step by step procedure for loading the stapler. It was determined that every subject had successfully loaded his stapler before the beginning of the experiment. Loading and operation of the stapler seemed to be difficult for a number of the subjects, but these difficulties assumedly occurred equally in each group. Although subjects were instructed in the written directive to repair their own stapler if it gave them trouble, extra staplers were available and subjects were told that if they felt they were using more than 30 seconds in repairing an inoperative stapler they could come to the front of the room and exchange it for an unloaded operative stapler. This privilege seemed to be used frequently by a good many of the subjects in each group in each experimental session. A few subjects used all their index cards and were allowed to come to the front of the room for a new supply of index cards.

Experiment II: The Typing Experiment
(Oral Instructions)

Subjects

In this experiment students in two classes in advanced typewriting were utilized as subjects. These classes were composed of advanced office administration students who had the necessary qualifications and typing skills to qualify for enrollment in the course. Since the two classes were of the same course, the same prerequisites were applicable and it was assumed that the typing skills of each class, as a group, would be very similar. Although approximately 30 students were enrolled in each class, only those who were present on two successive class days were included in each group. Therefore, only 15 subjects were included in the first group which was designated as the control group and 20 subjects were included in the second group which was designated as the experimental group.

The Task

Subjects typed a letter which was a request for office managers to complete a questionnaire and return it to the senders. (See Appendix B). The task was performed on two successive class days. Subjects were told that individually typed letters were needed as cover letters for mailing the questionnaire.

The problem was administered in two phases. The first phase was conducted on Wednesday and the second phase

was administered on the following Friday. Although the typing instructor was present on both days, she only checked the roll and asked the subjects to follow the directives of the administrator of the problem.

Phase I. On the first day, phase one of the experiment was administered by a colleague of the researcher. In each of the two classes he presented the problem to the subjects, informing them that the letters were to be typed for mailing to office managers as a cover letter for the questionnaire. This was portrayed as a real research project, although actually the letters were only for purposes of this experiment. The administrator on this day gave similar directives to each group. He distributed the duplicated letter and letter head which was specially printed for the purpose of this experiment. The letter head was produced by off-set printing on office bond paper and was headed "Clerical Efficiency Research Project" with a university address.

The style requirements were noted at the bottom of the duplicated letter and were called to the attention of the subjects by the administrator. The style requirements were the same as those used in class assignments. The subjects were verbally instructed to use their most efficient rate of typing and to produce as many mailable letters as they could during the production period. They were not told the production time, but were stopped at the end of 35 minutes, thus assuring that they would continue to type for the full period.

At the end of the first phase, the subjects were instructed to stop and turn in all letters, both completed and incomplete. They were told by the administrator that on the second day they would continue typing more of the very same letter.

Phase II. In the second phase of this experiment, the researcher administered the problem to both groups of subjects. The colleague who had administered the problem on the previous class day was not present. With the control group the researcher merely restated the directives which had been previously given by the colleague administrator in the first phase of the experiment. He distributed the letter head and the same duplicated letter, instructing the subjects that they were to do the same task they had previously done under the supervision of the previous administrator. That is, the researcher merely reinforced or respected the directives given by the colleague on the first day of the experiment, such that the control group was presumedly working under conditions of unified commands.

With the experimental group the researcher specifically countermanded some of the directives which had been given by the colleague on the first day of the experiment by informing the subjects that five aspects of the letter which had been typed on the previous session were wrong. He indicated that the colleague had given incorrect directions. In general, it was stated that the colleague had given

erroneous instructions and was misinformed about the nature of the research project. It was suggested that the administrator in the first session had even assumed authority not rightfully his.

In this phase of the experiment, the administrator prescribed five major changes in the content of the letter, No changes were prescribed in letter style. The changes were:

1. A change was made in the date. The colleague had instructed the subjects to use the current date. The researcher verbally advised that the letter should be typed using a date about a month in the future, indicating that the questionnaire would not be mailed until that date.
2. A change was made in the estimated time to complete the questionnaire. The original letter under the colleague stated that it would take only about five minutes to complete the questionnaire. The researcher verbally directed the subjects to change the time to forty-five minutes, indicating to the subjects that the colleague was not aware of the length of the questionnaire.
3. A change was made in the statement of the nature of the research project.
4. A change was made in the requirement for the addressee to receive a complimentary copy of

the results of the study. The subjects had typed the letter the first day indicating that the addressee need only sign his name and address on the questionnaire to receive a complimentary copy of the results of the study. The researcher instructed the subjects to change this to require a stamped self-addressed envelope if the addressee wished to have the results of the study.

5. A change in signature order and title of the two signers was made by the researcher. Under the supervision of the colleague, the subjects had typed the colleague's name above the researcher's name using the title of Project Director for himself and giving the researcher the title of Research Associate. The researcher countermanded this and directed the subjects that he, the researcher, was actually the Project Director and that his name should be placed first with that title, giving the colleague the title of Research Associate.

Controls

Methods used in this study to ensure that factors, other than the independent variable, were held constant included the following:

1. Each group typed in the same room using the same equipment. Since this was also the usual classroom where the subjects normally typed in class, they were using their usual machines and were working in their usual environment.
2. For each group the first phase of the experiment was conducted on a Wednesday and the second phase was conducted on a Friday. The classes used for the experiment were near the same time. One class was at 9:30 A. M. and the other was at 10:30 A. M. These were considered "prime" class times and the one hour difference in time was expected to be of minimum significance.
3. Constant administrative or supervisory style in each phase was utilized. The colleague made an effort to use the same style of personal supervision on the first phase of the experiment and the researcher made the same effort in the second phase.
4. The changes in the letter requested by the administrator in the second phase of the experiment involved typing an identical number of strokes as the original letter contained.
5. Each group was allowed the same 35 minute typing period on each of the two days.

Measurement

In measuring the output of both groups on each of the two days, a standard procedure was followed as suggested by the typing instructor. Every five strokes were considered as one word. The letter contained a total of 314 words and partially completed letters were evaluated by the number of words actually typed, using the same five stroke definition of a word. The letters were carefully checked for errors. Errors and unacceptable erasures were uniformly penalized from the total gross words typed at the rate of ten words each in determining the number of total net words typed. Thus, the measure of output was the total net words typed.

Experiment III. The Rectangle Arrangement Experiment (Written Instructions)

The idea for this experiment was developed from an exercise described by Leavitt. He used the exercise as a device to test the relative effectiveness of one-way versus two-way communication.⁴

Subjects

In this experiment 82 third year Army R. O. T. C. students were used as subjects. The problem was administered in four different classes. The subjects in each class were

⁴Harold J. Leavitt, Managerial Psychology (Chicago: The University of Chicago Press, 1958), pp. 118-128.

randomly divided into two groups; thus, there were 41 subjects in the control group and 41 subjects in the experimental group.

The Task

Subjects were given written directions to draw an arrangement of five rectangles. (See Appendix C). The written instructions simulated directions given by two bosses. After two pilot studies, it was decided that it was best to alternate the instructions given by each of two bosses such that Boss A instructed the subject on the procedure for drawing the first rectangle, after which Boss B gave a set of instructions for drawing the first rectangle. The same procedure was followed for each of the other four rectangles. All subjects were allowed ten minutes to complete the problem. No questions were answered after the beginning of the experiment.

The directions given to the control group by the two bosses were completely unified in that each boss gave identical directives. Thus, the control group was working under conditions of unity of command.

The experimental group received conflicting directives on the procedure to follow in drawing the rectangle arrangement. Thus, the experimental group was working under conditions of disunity of command. The set of directives given by one boss were identical to the directives given to the control group, but the set of directives given by the

other boss were for a mirror image of the first rectangle arrangement. It was felt that a mirror image was preferable over a completely different arrangement of rectangles to eliminate any possible difference in difficulty of drawing certain angles and other rectangle relationships.

To eliminate any possible tendency of the subjects in the experimental group to follow the instructions of either Boss A or Boss B, one half of the instructions for the experimental group had Boss A give the directions for the original rectangle arrangement and one half of the instructions had Boss B give these directives. Boss A in all cases gave the first directive for each rectangle. Thus, any tendency to follow one boss or the other, or any tendency to follow either the first boss or the second boss, was offset for the experimental group by this procedure.

Controls

The controls utilized in this experiment were similar to those used in the other experiments reported. These included:

1. Both the control group and the experimental group for each class were in the same class room at the same time. This assured a constancy of environment for both groups. Each of the four sessions were held in the same class room.

2. The division of each class into two experimental groups was done randomly. This assured that any difference in ability of aptitudes of the subjects placed into the two groups was determined by chance rather than by any bias of the experimenter.
3. Since the problem was administered to each group simultaneously in each of the four classes, the subjects in each group were subjected to the same administrator. Thus, there was a minimum difference in the style or mannerism of the administration for each group.
4. Any tendency of the experimental group to follow the instructions of either Boss A or Boss B was cancelled. This was accomplished by the procedure of having half of the experimental group receiving the same instructions as the control group from Boss A while the other half received the instructions for the mirror image from Boss A.

Measurement

The dependent variable for this experiment was the number of rectangles correctly drawn by the subjects in each group. The possible scores for each subject ranged from 0 to 5, the score being the number of rectangles correctly drawn.

Determining the number of correct rectangles drawn by the control group was a relatively simple procedure. A rectangle was considered correct if it was drawn according to the instructions given by each of the two bosses. Since both of the two bosses gave identical instructions, measurement was no problem. Correctness for Rectangle 1 was determined by its proper placement on the page. Correctness for Rectangles 2 through 5 was determined by whether they were correctly positioned relative to the preceding rectangle.

The number of rectangles correctly drawn by subjects in the experimental group was determined by the same standards as were used for the control group. Although subjects in this group were in a position of choosing whether to follow the instructions of Boss A or Boss B, their scores were determined by the number of rectangles correctly drawn (according to the directions given) by the control group. This was according to the directions of Boss A for one half of the experimental group and Boss B for the other half of the group.

All subjects in this experiment were instructed, before reading the directions of the two bosses, that they were to draw one diagram of five rectangles. However, some of the subjects in the experimental group attempted to satisfy both bosses by drawing more than 5 rectangles. They usually did this by attempting to consolidate the correct

rectangle arrangement with the mirror image arrangement. In those cases, subjects were still given credit for those rectangles which were correctly drawn by the above standards.

The Morale Scale

Part of these experiments was to determine any possible differences in the morale of the subjects in the control group and the experimental group on the assumption that working under unity of command as opposed to disunity of command might possibly influence the morale, as well as the productivity of the subjects.

It was decided to utilize the semantic differential as a measuring device to test the hypothesis of no difference in the morale of the experimental group and the control group in each of the three experiments. Shaw and Wright said of using the semantic differential for the purpose of measuring attitudes:

The semantic differential is really more a method for measuring attitudes than a method for constructing attitude scales. In fact, it may be thought of as an attitude scale, although the particular items included in the scale may vary.⁵

Using factor analytic procedures, Osgood and Suci have established three general factors of meaning measured by the semantic differential technique: an evaluative factor,

⁵Marvin E. Shaw and Jack M. Wright, Scales for the Measurement of Attitudes (New York: McGraw-Hill Book Company, 1967), pp. 29-30.

a potency factor, and an activity factor.⁶ Since they identify an attitude as an evaluative factor, the evaluative factors appear appropriate to measure the direction and intensity of an individual's attitude toward the object or concept being rated.

It has been found that the semantic differential may be used to evaluate a number of concepts of formal organization. In a recent article on the use of modified semantic differentials, Hay said:

. . . we can adapt a semantic differential to a variety of projects dealing with meanings of concepts, products, images, and so forth which can be very useful in evaluating various phases of a business organization.⁷

For purposes of evaluating the morale of the subjects in these experiments, a scale was developed using the semantic differential composed of those items which Osgood and Suci had found to have a high loading (.75 or more) on the evaluative factor. (See Appendix D). The subjects were given the form immediately following the experiment, in which they were asked to indicate the direction and intensity of how each bi-polar word set described their morale as it had been influenced by the task which they had completed.

⁶Charles E. Osgood and George J. Suci, "Factor Analysis of Meaning," Semantic Differential Technique, ed. by James G. Snider and Charles E. Osgood (Chicago: Aldine Publishing Company, 1969), pp. 42-55.

⁷Robert D. Hay, "Use of Modified Semantic Differentials To Evaluate Formal Organizational Structure," The Academy of Management Journal, XII (June, 1969), p. 249.

The morale scales were evaluated for each group, giving weight to the number of responses in each of seven categories for each bi-polar word set. Profiles were generated and means were calculated for each bi-polar word item for each group in each of the three experiments. The significance of difference of the mean scores for the control group and the experimental group in each experiment was determined by the use of the t test at the .05 level of significance.

Summary

Three separate experiments were described which were utilized to test the hypothesis as stated on page 6. The three experiments are identified as follows:

Experiment I. Porthole Assembly Experiment
(Visual Instructions)

Experiment II. Typing Experiment
(Oral Instructions)

Experiment III. Rectangle Arrangement Experiment
(Written Instructions)

In each experiment the hypothesis was tested using the t test at the .05 level of confidence. The experimental tasks and controls are described in detail.

The following chapter reports the results of these experiments.

CHAPTER IV

RESULTS OF THE EXPERIMENTS

General

The purpose of this study was to test the null hypothesis, as stated in the introductory chapter, at the .05 level of confidence. If the hypothesis was accepted, then it was assumed that there was no difference between the control group and the experimental group. If the hypothesis was rejected, then an alternate hypothesis was assumed which could either indicate a difference favoring the control group or the experimental group. For each experiment a statistical test was made for the purpose of determining the probability that any difference in the performance of the control group and the experimental group was due to a chance variation.

Statistical Test

To test the null hypothesis for each experiment, the t statistic was utilized. This statistic is defined as the ratio of the difference between the means divided by the standard error of the difference.¹ When the sample

¹N. M. Downie and R. W. Heath, Basic Statistical Methods (New York: Harper and Brothers, Publishers, 1959), p. 134.

size of each group is equal, the following formula can be used:²

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\Sigma x_1^2 - \Sigma x_2^2}{n(n-1)}}$$

When the sample sizes are not equal, the formula is stated differently as:³

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\Sigma x_1^2 + \Sigma x_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

Since the number of subjects in the control group and the experimental group were the same size in the porthole experiment and the rectangle experiment, the first formula was used to calculate t in these two experiments. The number of subjects in the control group and the experimental group were unequal in the typing experiment, so the second form of the t formula was used to test the hypothesis for this experiment.

²Paul A. Games and George R. Klare, Elementary Statistics: Data Analysis for the Behavioral Sciences (New York: McGraw-Hill Book Company, 1967), p. 330.

³Ibid.

Results of Experiment I: The Porthole Assembly Experiment
(Visual Instructions)

The results of the first experiment, the porthole assembly, are shown below:

TABLE 1
PERFORMANCE SCORES FOR SUBJECTS ON
THE PORTHOLE ASSEMBLY EXPERIMENT

Control Group (Unity of Command) N = 48			Experimental Group (Disunity of Command) N = 48		
Number Portholes Assembled	Frequency	Value	Number Portholes Assembled	Frequency	Value
9	1	9	9	0	0
8	1	8	8	1	8
7	3	21	7	3	21
6	5	30	6	5	30
5	5	25	5	9	45
4	2	8	4	11	44
3	7	21	3	9	27
2	14	28	2	7	14
1	6	6	1	2	2
0	4	0	0	1	0
		$\Sigma = 156$			$\Sigma = 191$
		$\bar{X} = 3.25$			$\bar{X} = 3.98$

$t = 1.758^*$

*Not significant

Value required for significance at .05 level = 1.98

Results of Experiment II: The Typing Experiment
(Oral Instructions)

TABLE 2
PERFORMANCE SCORES FOR SUBJECTS ON
THE TYPING EXPERIMENT
PHASE I. FIRST DAY

Control Group (Unity of Command) N = 15			Experimental Group (Disunity of Command) N = 20		
Gross Words Typed	Number Errors	Net Words Typed	Gross Words Typed	Number Errors	Net Words Typed
1813	7	1743	1398	5	1348
1429	6	1369	1313	2	1293
1417	13	1287	1308	3	1278
1251	0	1251	1256	2	1236
1145	0	1145	1256	4	1216
1166	3	1136	1254	5	1204
1101	2	1081	1216	5	1166
1186	11	1076	1175	2	1155
1024	2	1004	1195	5	1145
918	2	898	1101	1	1091
942	5	892	1103	3	1073
928	4	888	1026	0	1026
932	11	822	1041	2	1021
871	15	721	1012	0	1012
899	19	709	1109	11	999
			1011	5	961
			978	2	958
			942	5	892
			845	1	835
			628	3	598
<hr/>			<hr/>		
Σ 's = 17,022	100	16,022	22,167	66	21,507
\bar{X} 's = 1,134.8	6.7	1,068	1,108.4	3.3	1,075.4

t value for net words typed = .0751*

*Not Significant

Value required for significance at .05 level = 2.042

t value for number of typing errors = 2.281**

**Significant

Value required for significance at .05 level = 2.042

TABLE 3
PERFORMANCE SCORES FOR SUBJECTS ON
THE TYPING EXPERIMENT
PHASE II. SECOND DAY

Control Group (Unity of Command) N = 15			Experimental Group (Disunity of Command) N = 20		
Gross Words Typed	Number Errors	Net Words Typed	Gross Words Typed	Number Errors	Net Words Typed
1810	0	1810	1505	4	1465
1355	11	1245	1468	18	1288
1856	62	1236	1229	0	1229
1138	1	1128	1570	8	1490
1026	1	1016	1256	1	1246
1245	4	1205	1599	2	1579
1138	3	1108	1228	2	1208
1059	84	219	1247	2	1227
1081	1	1071	1256	9	1166
919	7	849	1158	0	1158
942	8	862	1251	0	1251
686	2	666	1041	1	1031
835	9	745	1196	4	1156
846	3	816	1002	0	1002
917	14	777	1183	11	1073
			1075	5	1025
			979	4	939
			942	3	912
			1006	0	1006
			942	7	872
<hr/>			<hr/>		
Σ 's = 16,853	210	14,753	24,133	81	23,323
<hr/>			<hr/>		
\bar{X} 's = 1,123.5	14	983.5	1,206.7	4	1,166.1

t value for net words typed = 1.962*

*Not Significant

t value required for significance at .05 level = 2.042

t value for number of typing errors = 1.782 *

*Not Significant

t value required for significance at .05 level = 2.042

From the data presented on the previous two pages, it can be seen that there was no significant difference in net words typed on the first phase of the experiment. It is of interest, however, that the difference in number of errors committed during the first phase by the control group was significantly greater. In the second phase, there was no significant difference in net words typed. There was also no significant difference in the number of errors committed in the second phase of the experiment.

Phase I of this experiment was necessary in the experimental design for two reasons. First, it was used to determine whether there was any significant difference in the typing abilities of the two groups of subjects. On the test of difference in total net words typed, Phase I indicated no significant difference in the productivity of the two groups. Therefore, it was assumed that the control group and the experimental group were equally matched with regard to their over all typing abilities. Second, Phase I was necessary to provide a simulation of disunity of command in Phase II. The test of difference of errors committed is discussed in the following chapter. The production of the subjects was adjusted by the number of errors, so the net production reflects the errors of each subject.

Results of Experiment III. The Rectangle Arrangement Experiment
(Written Instructions)

The results of the rectangle arrangement experiment are shown below:

TABLE 4
 PERFORMANCE SCORES FOR SUBJECTS ON
 THE RECTANGLE ARRANGEMENT EXPERIMENT

Control Group (Unity of Command) N = 41			Experiment Group (Disunity of Command) N = 41		
Number Rectangles Correct	Frequency	Value	Number Rectangles Correct	Frequency	Value
5	11	55	5	5	25
4	26	104	4	6	24
3	0	0	3	4	12
2	0	0	2	4	8
1	0	0	1	17	17
0	4	0	0	5	0
Total		159			86
Mean		3.878			2.098

$t = 5.29^{**}$

****Significant**

Value required for significance at .05 level = 1.98

Thus, the null hypothesis was rejected for the rectangle arrangement experiment.

Morale Scales

In this section of the report, the results of the morale scale are reported. For each experiment, the number of responses for each of seven categories for each bi-polar word set are shown for each group. This is followed by the mean scores for each bi-polar word set for each group. Then the t test is reported to indicate the significance of difference on the morale scale for the control group and the experimental group.

The mean scores of each bi-polar word item for the control group and the experimental group were then calculated for each experiment. These mean scores were computed by multiplying the number of responses for each category times the weight assigned to that response and dividing by the number of subjects in the group. After the mean scores for each group were determined, the t statistic was calculated as shown in Tables 7, 10 and 13.

Morale Scale for Experiment I. Porthole Assembly Experiment
(Visual Instruction)

TABLE 5

PORTHOLE ASSEMBLY EXPERIMENT -- MORALE SCALE
 FREQUENCY DISTRIBUTION OF RESPONSES OF
 CONTROL GROUP (UNITY OF COMMAND)

Values For Each Response Category of Scale							
<u>Favorable</u>	+3	+2	+1	0	-1	-2	<u>Unfavorable</u>
Good	<u>5</u>	<u>9</u>	<u>12</u>	<u>3</u>	<u>10</u>	<u>6</u>	<u>3</u> : Bad
Beautiful	<u>1</u>	<u>1</u>	<u>6</u>	<u>25</u>	<u>11</u>	<u>3</u>	<u>1</u> : Ugly
Sweet	<u>1</u>	<u>1</u>	<u>12</u>	<u>19</u>	<u>11</u>	<u>4</u>	<u>0</u> : Sour
Clean	<u>6</u>	<u>7</u>	<u>13</u>	<u>18</u>	<u>2</u>	<u>2</u>	<u>0</u> : Dirty
Tasty	<u>0</u>	<u>4</u>	<u>6</u>	<u>22</u>	<u>7</u>	<u>5</u>	<u>4</u> : Distasteful
Valuable	<u>3</u>	<u>6</u>	<u>15</u>	<u>7</u>	<u>7</u>	<u>5</u>	<u>5</u> : Worthless
Kind	<u>4</u>	<u>2</u>	<u>12</u>	<u>22</u>	<u>5</u>	<u>2</u>	<u>1</u> : Cruel
Pleasant	<u>1</u>	<u>12</u>	<u>16</u>	<u>7</u>	<u>6</u>	<u>6</u>	<u>0</u> : Unpleasant
Happy	<u>2</u>	<u>9</u>	<u>15</u>	<u>12</u>	<u>7</u>	<u>2</u>	<u>1</u> : Sad
Sacred	<u>0</u>	<u>1</u>	<u>4</u>	<u>31</u>	<u>8</u>	<u>4</u>	<u>0</u> : Profane
Nice	<u>0</u>	<u>9</u>	<u>17</u>	<u>12</u>	<u>7</u>	<u>2</u>	<u>1</u> : Awful
Fragrant	<u>0</u>	<u>2</u>	<u>6</u>	<u>32</u>	<u>3</u>	<u>4</u>	<u>1</u> : Foul
Honest	<u>7</u>	<u>9</u>	<u>11</u>	<u>17</u>	<u>3</u>	<u>1</u>	<u>0</u> : Dishonest
Fair	<u>6</u>	<u>10</u>	<u>11</u>	<u>10</u>	<u>4</u>	<u>6</u>	<u>1</u> : Unfair

TABLE 6

PORTHOLE ASSEMBLY EXPERIMENT -- MORALE SCALE
 FREQUENCY DISTRIBUTION OF RESPONSES OF
 EXPERIMENTAL GROUP (DISUNITY OF COMMAND)

Values For Each Response Category of Scale								
<u>Favorable</u>	+3	+2	+1	0	-1	-2	-3	<u>Unfavorable</u>
Good	<u>0</u>	<u>15</u>	<u>9</u>	<u>11</u>	<u>5</u>	<u>4</u>	<u>4</u>	Bad
Beautiful	<u>1</u>	<u>3</u>	<u>8</u>	<u>31</u>	<u>2</u>	<u>2</u>	<u>1</u>	Ugly
Sweet	<u>0</u>	<u>1</u>	<u>7</u>	<u>29</u>	<u>8</u>	<u>1</u>	<u>2</u>	Sour
Clean	<u>3</u>	<u>12</u>	<u>10</u>	<u>20</u>	<u>2</u>	<u>0</u>	<u>1</u>	Dirty
Tasty	<u>0</u>	<u>1</u>	<u>7</u>	<u>31</u>	<u>7</u>	<u>2</u>	<u>0</u>	Distasteful
Valuable	<u>2</u>	<u>5</u>	<u>7</u>	<u>14</u>	<u>6</u>	<u>10</u>	<u>4</u>	Worthless
Kind	<u>0</u>	<u>3</u>	<u>14</u>	<u>27</u>	<u>3</u>	<u>1</u>	<u>0</u>	Cruel
Pleasant	<u>1</u>	<u>15</u>	<u>15</u>	<u>5</u>	<u>8</u>	<u>2</u>	<u>2</u>	Unpleasant
Happy	<u>2</u>	<u>8</u>	<u>11</u>	<u>24</u>	<u>3</u>	<u>0</u>	<u>0</u>	Sad
Sacred	<u>0</u>	<u>1</u>	<u>1</u>	<u>43</u>	<u>1</u>	<u>1</u>	<u>1</u>	Profane
Nice	<u>0</u>	<u>7</u>	<u>15</u>	<u>19</u>	<u>3</u>	<u>3</u>	<u>1</u>	Awful
Fragrant	<u>0</u>	<u>0</u>	<u>10</u>	<u>33</u>	<u>5</u>	<u>0</u>	<u>0</u>	Foul
Honest	<u>4</u>	<u>7</u>	<u>13</u>	<u>21</u>	<u>2</u>	<u>1</u>	<u>0</u>	Dishonest
Fair	<u>4</u>	<u>8</u>	<u>13</u>	<u>13</u>	<u>5</u>	<u>4</u>	<u>1</u>	Unfair

TABLE 7

EXPERIMENT I.
PORTHOLE ASSEMBLY EXPERIMENT -- MORALE SCALE MEANS

Bi-Polar Item	Mean Score On Item Control Group (Unity of Command)	Mean Score On Item Experimental Group (Disunity of Command)
Good - Bad	+.0833	+.2917
Beautiful - Ugly	-.1875	+.1667
Sweet - Sour	-.0417	-.1458
Clean - Dirty	+.6042	+.7917
Tasty - Distasteful	-.3125	-.0417
Valuable - Worthless	+.2917	-.3125
Kind - Cruel	+.3333	+.3125
Pleasant - Unpleasant	+.5208	+.6250
Happy - Sad	+.5208	+.5625
Sacred - Profane	-.0417	-.0208
Nice - Awful	+.4375	+.3542
Fragrant - Foul	-.0833	+.1042
Honest - Dishonest	+.9375	+.9375
Fair - Unfair	+.4167	+.5209
Sums	+3.7291	+4.1461
\bar{X} 's	+ .2664	+ .2962

t = .2235*

*Not Significant

Value required for significance at .05 level = 2.056

Therefore, the hypothesis of no difference in the morale of the control group and the experimental group was not rejected for the first experiment.

Morale Scale for Experiment II. The Typing Experiment
(Oral Instructions)

TABLE 8

TYPING EXPERIMENT -- MORALE SCALE
 FREQUENCY DISTRIBUTION OF RESPONSES OF
 CONTROL GROUP (UNITY OF COMMAND)

Values For Each Response Category of Scale							
<u>Favorable</u>	+3	+2	+1	0	-1	-2	<u>Unfavorable</u>
Good	<u>4</u>	<u>1</u>	<u>3</u>	<u>0</u>	<u>3</u>	<u>2</u>	<u>2</u> : Bad
Beautiful	<u>0</u>	<u>1</u>	<u>3</u>	<u>8</u>	<u>1</u>	<u>1</u>	<u>1</u> : Ugly
Sweet	<u>0</u>	<u>0</u>	<u>6</u>	<u>4</u>	<u>2</u>	<u>2</u>	<u>1</u> : Sour
Clean	<u>5</u>	<u>1</u>	<u>3</u>	<u>6</u>	<u>0</u>	<u>1</u>	<u>1</u> : Dirty
Tasty	<u>1</u>	<u>0</u>	<u>3</u>	<u>6</u>	<u>3</u>	<u>1</u>	<u>1</u> : Distasteful
Valuable	<u>4</u>	<u>3</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>1</u> : Worthless
Kind	<u>2</u>	<u>0</u>	<u>2</u>	<u>9</u>	<u>1</u>	<u>0</u>	<u>1</u> : Cruel
Pleasant	<u>4</u>	<u>2</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>1</u> : Unpleasant
Happy	<u>2</u>	<u>3</u>	<u>5</u>	<u>2</u>	<u>1</u>	<u>2</u>	<u>0</u> : Sad
Sacred	<u>1</u>	<u>0</u>	<u>1</u>	<u>12</u>	<u>0</u>	<u>1</u>	<u>0</u> : Profane
Nice	<u>1</u>	<u>4</u>	<u>2</u>	<u>4</u>	<u>2</u>	<u>0</u>	<u>2</u> : Awful
Fragrant	<u>1</u>	<u>0</u>	<u>2</u>	<u>9</u>	<u>2</u>	<u>0</u>	<u>1</u> : Foul
Honest	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>0</u>	<u>0</u>	<u>1</u> : Dishonest
Fair	<u>3</u>	<u>3</u>	<u>3</u>	<u>4</u>	<u>0</u>	<u>1</u>	<u>1</u> : Unfair

TABLE 9

TYPING EXPERIMENT -- MORALE SCALE
 FREQUENCY DISTRIBUTION OF RESPONSES OF
 EXPERIMENTAL GROUP (DISUNITY OF COMMAND)

Values For Each Response Category of Scale								
<u>Favorable</u>	+3	+2	+1	0	-1	-2	-3	<u>Unfavorable</u>
Good	<u>3</u>	<u>3</u>	<u>11</u>	<u>1</u>	<u>2</u>	<u>0</u>	<u>0</u>	Bad
Beautiful	<u>0</u>	<u>3</u>	<u>9</u>	<u>6</u>	<u>2</u>	<u>0</u>	<u>0</u>	Ugly
Sweet	<u>0</u>	<u>6</u>	<u>3</u>	<u>7</u>	<u>4</u>	<u>0</u>	<u>0</u>	Sour
Clean	<u>3</u>	<u>8</u>	<u>3</u>	<u>4</u>	<u>2</u>	<u>0</u>	<u>0</u>	Dirty
Tasty	<u>0</u>	<u>4</u>	<u>5</u>	<u>9</u>	<u>1</u>	<u>1</u>	<u>0</u>	Distasteful
Valuable	<u>3</u>	<u>5</u>	<u>5</u>	<u>2</u>	<u>3</u>	<u>2</u>	<u>0</u>	Worthless
Kind	<u>2</u>	<u>4</u>	<u>7</u>	<u>5</u>	<u>2</u>	<u>0</u>	<u>0</u>	Cruel
Pleasant	<u>6</u>	<u>8</u>	<u>2</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>0</u>	Unpleasant
Happy	<u>6</u>	<u>5</u>	<u>4</u>	<u>3</u>	<u>2</u>	<u>0</u>	<u>0</u>	Sad
Sacred	<u>0</u>	<u>1</u>	<u>1</u>	<u>15</u>	<u>1</u>	<u>2</u>	<u>0</u>	Profane
Nice	<u>4</u>	<u>5</u>	<u>7</u>	<u>2</u>	<u>1</u>	<u>1</u>	<u>0</u>	Awful
Fragrant	<u>0</u>	<u>3</u>	<u>4</u>	<u>12</u>	<u>0</u>	<u>1</u>	<u>0</u>	Foul
Honest	<u>6</u>	<u>6</u>	<u>3</u>	<u>5</u>	<u>0</u>	<u>0</u>	<u>0</u>	Dishonest
Fair	<u>9</u>	<u>5</u>	<u>1</u>	<u>3</u>	<u>1</u>	<u>1</u>	<u>0</u>	Unfair

TABLE 10
EXPERIMENT II
TYPING EXPERIMENT -- MORALE SCALE MEANS

Bi-Polar Item	Mean Score On Item Control Group (Unity of Command)	Mean Score On Item Experimental Group (Disunity of Command)
Good - Bad	+ .267	+1.100
Beautiful - Ugly	- .067	+ .650
Sweet - Sour	- .200	+ .550
Clean - Dirty	+1.333	+1.300
Tasty - Distasteful	- .133	+ .500
Valuable - Worthless	+1.000	+ .850
Kind - Cruel	+ .267	+ .950
Pleasant - Unpleasant	+1.200	+1.650
Happy - Sad	+ .800	+1.500
Sacred - Profane	+ .133	0.000
Nice - Awful	+ .333	+1.300
Fragrant - Foul	0.000	+ .400
Honest - Dishonest	+1.533	+1.650
Fair - Unfair	+ .867	+1.750
Sums	+7.333	+14.150
$\bar{X}'s =$	+ .5237	+ 1.0107

$t = 2.292^{**}$

** Significant

Value required for significance at the .05 level = 2.056

The hypothesis of no difference in the morale, as measured by the semantic differential morale scale, was rejected in the typing experiment. The morale of the experimental group was significantly higher.

Morale Scale for Experiment III. The Rectangle Arrangement
Experiment (Written Instructions)

TABLE 11

RECTANGLE ARRANGEMENT EXPERIMENT -- MORALE SCALE
FREQUENCY DISTRIBUTION OF RESPONSES OF
CONTROL GROUP (UNITY OF COMMAND)

Values For Each Response Category of Scale							
<u>Favorable</u>	+3	+2	+1	0	-1	-2	<u>Unfavorable</u>
Good	<u>2</u>	<u>9</u>	<u>15</u>	<u>6</u>	<u>6</u>	<u>1</u>	<u>2</u> : Bad
Beautiful	<u>0</u>	<u>2</u>	<u>4</u>	<u>26</u>	<u>6</u>	<u>2</u>	<u>1</u> : Ugly
Sweet	<u>0</u>	<u>1</u>	<u>4</u>	<u>26</u>	<u>7</u>	<u>1</u>	<u>2</u> : Sour
Clean	<u>1</u>	<u>6</u>	<u>7</u>	<u>26</u>	<u>0</u>	<u>1</u>	<u>0</u> : Dirty
Tasty	<u>0</u>	<u>2</u>	<u>6</u>	<u>21</u>	<u>6</u>	<u>4</u>	<u>2</u> : Distasteful
Valuable	<u>3</u>	<u>7</u>	<u>12</u>	<u>5</u>	<u>6</u>	<u>5</u>	<u>3</u> : Worthless
Kind	<u>0</u>	<u>5</u>	<u>8</u>	<u>23</u>	<u>2</u>	<u>2</u>	<u>1</u> : Cruel
Pleasant	<u>3</u>	<u>7</u>	<u>12</u>	<u>4</u>	<u>10</u>	<u>3</u>	<u>2</u> : Unpleasant
Happy	<u>1</u>	<u>8</u>	<u>9</u>	<u>16</u>	<u>5</u>	<u>1</u>	<u>1</u> : Sad
Sacred	<u>0</u>	<u>0</u>	<u>1</u>	<u>32</u>	<u>5</u>	<u>1</u>	<u>2</u> : Profane
Nice	<u>0</u>	<u>5</u>	<u>9</u>	<u>22</u>	<u>3</u>	<u>0</u>	<u>2</u> : Awful
Fragrant	<u>0</u>	<u>2</u>	<u>6</u>	<u>29</u>	<u>2</u>	<u>1</u>	<u>1</u> : Foul
Honest	<u>4</u>	<u>10</u>	<u>9</u>	<u>14</u>	<u>2</u>	<u>0</u>	<u>2</u> : Dishonest
Fair	<u>4</u>	<u>13</u>	<u>9</u>	<u>12</u>	<u>1</u>	<u>1</u>	<u>1</u> : Unfair

TABLE 12

RECTANGLE ARRANGEMENT EXPERIMENT -- MORALE SCALE
 FREQUENCY DISTRIBUTION OF RESPONSES OF
 EXPERIMENTAL GROUP (DISUNITY OF COMMAND)

Values For Each Response Category of Scale							
<u>Favorable</u>	+3	+2	+1	0	-1	-2	<u>Unfavorable</u>
Good	<u>3</u>	<u>8</u>	<u>6</u>	<u>4</u>	<u>5</u>	<u>9</u>	<u>6</u> : Bad
Beautiful	<u>0</u>	<u>5</u>	<u>6</u>	<u>21</u>	<u>4</u>	<u>4</u>	<u>1</u> : Ugly
Sweet	<u>0</u>	<u>0</u>	<u>10</u>	<u>15</u>	<u>9</u>	<u>6</u>	<u>1</u> : Sour
Clean	<u>0</u>	<u>7</u>	<u>8</u>	<u>21</u>	<u>1</u>	<u>2</u>	<u>2</u> : Dirty
Tasty	<u>0</u>	<u>2</u>	<u>2</u>	<u>21</u>	<u>8</u>	<u>5</u>	<u>3</u> : Distasteful
Valuable	<u>4</u>	<u>6</u>	<u>5</u>	<u>6</u>	<u>2</u>	<u>9</u>	<u>9</u> : Worthless
Kind	<u>3</u>	<u>0</u>	<u>7</u>	<u>16</u>	<u>9</u>	<u>6</u>	<u>0</u> : Cruel
Pleasant	<u>4</u>	<u>8</u>	<u>5</u>	<u>3</u>	<u>3</u>	<u>8</u>	<u>10</u> : Unpleasant
Happy	<u>1</u>	<u>10</u>	<u>4</u>	<u>15</u>	<u>6</u>	<u>4</u>	<u>1</u> : Sad
Sacred	<u>1</u>	<u>0</u>	<u>2</u>	<u>28</u>	<u>5</u>	<u>2</u>	<u>3</u> : Profane
Nice	<u>1</u>	<u>3</u>	<u>7</u>	<u>16</u>	<u>9</u>	<u>3</u>	<u>2</u> : Awful
Fragrant	<u>1</u>	<u>1</u>	<u>2</u>	<u>29</u>	<u>3</u>	<u>2</u>	<u>3</u> : Foul
Honest	<u>3</u>	<u>7</u>	<u>9</u>	<u>16</u>	<u>2</u>	<u>2</u>	<u>2</u> : Dishonest
Fair	<u>2</u>	<u>7</u>	<u>5</u>	<u>9</u>	<u>5</u>	<u>8</u>	<u>5</u> : Unfair

TABLE 13
EXPERIMENT III.
RECTANGLE ARRANGEMENT EXPERIMENT
MORALE SCALE MEANS

Bi-Polar Item	Mean Score On Item Control Group (Unity of Command)	Mean Score On Item Experimental Group (Disunity of Command)
Good - Bad	+ .6098	-.2439
Beautiful - Ugly	- .1220	+.0244
Sweet - Sour	- .2195	-.3415
Clean - Dirty	+ .4878	+.2683
Tasty - Distasteful	- .4878	-.5122
Valuable - Worthless	+ .3659	-.4390
Kind - Cruel	+ .2195	-.1219
Pleasant - Unpleasant	+ .3171	-.3902
Happy - Sad	+ .4390	+.4390
Sacred - Profane	- .2917	-.3171
Nice - Awful	+ .2439	-.1219
Fragrant - Foul	+ .0732	-.2195
Honest - Dishonest	+ .8049	+.4878
Fair - Unfair	+1.0000	-.2683
Sums	+4.0245	-1.7560
\bar{X} 's	+ .2875	- .1254

$t = 3.047^{**}$

****Significant**

Value required for significance at .05 level = 2.056

The hypothesis of no difference in the morale, as measured by the semantic differential morale scale, was rejected in the rectangle arrangement experiment. The morale of the control group was significantly higher.

Summary

The results of the experiments are summarized as follows: In two of the three experiments, there was no significant difference in the productivity of the control group and the experimental group. In one experiment, the productivity of the control group was significantly higher than the experimental group.

In one experiment, there was no significant difference in the morale of the control group and the experimental group. In one experiment, the morale of the experimental group was significantly higher than was the morale of the control group. In one experiment the morale of the control group was significantly higher than the morale of the experimental group.

These findings and their implications are discussed in the following chapter.

CHAPTER V

SUMMARY AND DISCUSSION

Summary of Results

The results of the three experiments conducted in this study are summarized below:

	<u>Null Hypothesis For:</u>	
	<u>Productivity</u>	<u>Morale</u>
<u>Experiment I.</u>		
Porthole Assembly Experiment (Visual Instructions)	Not Rejected	Not Rejected
<u>Experiment II.</u>		
Typing Experiment (Oral Instructions)	Not Rejected	Rejected
<u>Experiment III.</u>		
Rectangle Arrangement Experiment (Written Instructions)	Rejected	Rejected

Thus, the hypothesis of no difference in the control group and the experimental group was not rejected relative to the productivity of the two groups in the porthole assembly experiment and the typing experiment. In the rectangle arrangement experiment, the null was rejected in favor of a hypothesis that indicates that the productivity of the control group (unity of command) was significantly higher than the productivity of the experimental group (disunity of command).

In testing the difference of morale, somewhat different results are shown. In the porthole assembly experiment, no significant difference was found in the morale

of the two groups. In the typing experiment, the morale of the experimental group was judged to be significantly higher than the morale of the control group. In the rectangle arrangement experiment, the morale of the control group was judged to be significantly higher than the morale of the experimental group.

General

At the outset of the study, it was stated that the study was directed toward the question: "Is there a significant difference in performance or attitude when individuals work under conditions of disunity of command as opposed to when individuals work under conditions of unity of command?" The results of the study indicate that the answer to this question is: "A significant difference in productivity does not exist in two of the three situations studied. When there was a difference, that difference indicated greater productivity under unity of command. A significant difference in attitude did exist in two of the three situations studied".

Such an answer does not, in itself, validate or invalidate the principle of unity of command. However, it does raise some serious doubts about considering the principle as a dictum of organizational theory and practice. As was stated in the introductory chapter, the principle of unity of command has been taught in management textbooks for many

years and is generally stated as an absolute. The results of these experiments suggest that what has traditionally been taught about unity of command should be exposed to closer scrutiny. While the answer which this study can provide is, at best, only a qualified answer, it is an answer provided by an attempt involving the rigors of controlled research.

Discussion

Experiment I. The Porthole Assembly Experiment (Visual Instructions)

The porthole assembly experiment was designed to test the principle of unity of command under conditions simulating a simple manufacturing operation. The subjects assembled a simple product from index cards using a single machine--a stapler. Instructions were given visually by means of illustrations of the apparatus to be constructed. The difference in the productivity and morale of the control group and the experimental group was found to be insignificant by the test made in this situation.

In follow up interviews with subjects, it was found that some of the subjects in the experimental group admitted to being confused by the difference in the two illustrations, but they did not seem to feel that their productivity was seriously affected. However, they did indicate some concern about the evaluation of their output. These subjects seemed to feel that, although they were confused by the difference

in the illustrations, it did not affect their morale adversely because they worked only a short time in the experiment and no issue was made over the quality or the quantity of their output. They appeared to believe that if they had worked for a much longer period of time under these conditions, their morale would have declined. One subject in the experimental group indicated that the administrator of the experiment seemed to build good rapport with the group, and that if subjects described negative morale, it would have been an indication of displeasure with the administrator. This subject also indicated that he tried to produce a large number of portholes out of a desire to cooperate in the experiment.

In a follow up interview with a subject in the control group, the subject indicated that he was somewhat concerned about the two illustrations being alike. He stated that he kept wondering why two were used if they were both alike. He also expressed concern that he might have overlooked some small details of the illustrations and might not be placing his staples correctly. Another subject in the experimental group said that he felt good on the day of the experiment and had a good attitude toward everything.

The staplers used by all subjects had a tendency to give trouble. Assumedly these problems with the staplers occurred approximately equally in the experimental group and the control group and may have had an equally depressing

effect on the morale of the subjects in each group. Some subjects even asked after the experiment if some staplers jammed intentionally. (The staplers were all identical and were in operable condition at the beginning of the experiment for each group.)

The output on this experiment was evaluated heavily on quantity, rather than quality, of output. If the output had been evaluated by rigorous quality control standards, with the subjects being informed about the acceptability of their output as they produced the apparatus, different results may have occurred. However, this would have involved the introduction of another variable into the experiment when the intent was to simplify where possible.

Since the independent variable was administered visually in this experiment, it might possibly be concluded that people simply do not conceptualize disunity of command from visual commands. In a follow up interview, one subject in the experimental group did admit to not having observed any differences in the two illustrations. On the other hand, one subject in the control group said he thought the two illustrations were different. However, since similar results were found in the typing experiment, in which the independent variable was administered verbally, this conclusion seems unwarranted at the present time.

Experiment II. The Typing Experiment (Oral Instructions)

The typing experiment was designed to test the principle of unity of command in a situation where the subjects would be performing a task familiar to them that might be performed in an actual work situation. The difference in productivity was insignificant between the two groups.

The disunity of command which was introduced in Phase II for the experimental group seemed to present no special problem for this group. These subjects very willingly made the requested changes in the content of the letter although the administrator in Phase I of the experiment had told them to type the same letter at the next session. This might suggest that when an individual is subjected to contradicting commands from two superiors, he takes the command of the most recent supervisor. It is interesting to speculate on what may have been the results if both "bosses" had been present during Phase II.

One subject in the experimental group indicated satisfaction at knowing that they had an opportunity to type the letter "right". A total of 16 of the 20 subjects in the experimental group increased their net productivity in Phase II over their productivity in Phase I while only 6 of the 15 subjects in the control group increased their net productivity in Phase II over Phase I. The administrator in Phase II received the impression, from talking to the subjects, that their attitude was that if all the letters they had typed in the previous session were wrong

and unmailable, they should make an extra effort to do their best work so that enough letters would be available as cover letters for the research project.

While the difference in the net productivity of the two groups during Phase II was insignificant, the difference that did exist was in favor of the experimental group. Statistically speaking, one can only say that this difference occurred by chance. The possibilities suggested might help explain this difference, but they are still only possibilities.

Since errors were a factor in the output score (total net words typed), a test was also made for significance of difference in errors of the two groups. In Phase I, the control group did make significantly more errors than the experimental group, but in Phase II the difference in errors made by the two groups was insignificant. This was true although the total number of errors made by the control group increased by more than 100% in Phase II, while the errors made by the experimental group increased only about 25% in Phase II over the errors they had made in Phase I. A possible reason for the insignificance of the difference in errors in Phase II is the fact that almost 75% of total errors made by the control group were made by two subjects. The implication of this finding is difficult to evaluate. One might assume that unity of command helps an individual do more accurate work. Inspection of these data does not support such a conclusion since both groups made more errors

in Phase II than in Phase I. It is probable that errors are simply one dimension of overall productivity of typists and errors were not significantly related to the independent variable.

The test of morale indicated that the morale of the experimental group was significantly higher than the control group. This unexpected difference in morale of the two groups may be related to the fact that 16 of the 20 subjects in the experimental group increased their productivity in Phase II while only 6 of the 15 subjects in the control group improved their productivity in Phase II. The subjects in the experimental group could have been expressing satisfaction at having "done better" in spite of the situation of disunity of command. This might be an interesting area for future research. An interview with the typing instructor resulted in a subjective opinion that the typing abilities of the two groups of subjects were no different, but that those in the class which was used as the experimental group generally had a better attitude toward the class. This is consistent with the results shown on the morale scale.

Experiment III. The Rectangle Arrangement Experiment (Written Instructions)

In the rectangle arrangement experiment, the subjects in the experimental group had two sets of conflicting written directives, having been previously instructed to follow all directions on the page. Thus, the subjects in the experimental

group found themselves in a position of having to reconcile conflicting directives, or make a choice between the two. It was decided at the outset of the study to evaluate the experimental group in this experiment by the same standards as the control group. At first thought, this may seem illogical since the experimental group had no way of knowing which boss to follow. The possibility was considered of evaluating the experimental group by considering the subjects to have correctly drawn the rectangle arrangement if they correctly followed either boss's directives correctly. However, this idea was dropped because of reasoning that if an individual receives two conflicting directives from two superiors, which he is to simultaneously follow, and he chooses one or the other, only one boss will say he is correct.

Subjects in the experimental group were thus put in a position of having to choose to follow the directions of either Boss A or Boss B, and by so doing had only a 50% chance of selecting the boss by whose directions their work was evaluated. Some argument exists for the view that the control group's scores should be cut in half to be properly compared to the scores of the experimental group, although this method was not followed. Table 4, on page 72, also indicates that not all of the subjects in the control group were able to correctly solve the problem. Subjects in the control group seemed to either do very well or very poor on the problem.

During one of the two pilot studies conducted in designing this experiment, one subject in the control group expressed confusion over having two bosses who told her to do the same thing. The subject indicated that since she had two bosses, she did not expect them to give her identical instructions. Paradoxically, it may be that two identical instructions result in as much disunity as two disunified instructions.

The test made of morale of the control group and the experimental group indicated that the control group had significantly higher morale, as influenced by the experimental task, than the experimental group. In fact, the mean score on all 14 items on the semantic differential indicated a negative score for the experimental group. Considering the frustration which the experimental group evidently experienced, this is not a surprising finding. Whether this frustration was aggravated in the written situation cannot be clearly determined from the present data and may provide a basis for future study. Although subjects were instructed to ask no questions after the beginning of the experiment, some questions were asked which indicated a state of confusion. It was not possible, however, to determine whether the questions came from subjects in the experimental group or the control group.

Implications of the Findings

Experiments I and II.

The findings of the first two experiments, which indicated no significant difference in productivity under unity of command and disunity of command, tend to support the contentions of such writers as Drucker, McGregor, Argyris, Mayo and Simon among others.

Drucker would perhaps concur with certain of these findings as an indication that going through channels, to preserve unity of command, was undesirable. Perhaps the main reason for objecting to by-passing in the chain of command is a strong belief in the principle of unity of command in the classical sense. If the findings of Experiments I and II are accepted as being applicable to the by-passing situation, it appears that any benefits of organizational flexibility and improved communication which may result from by-passing are not necessarily offset by the claimed disadvantages of violating unity of command. These findings also tend to support Drucker's desire to organize on principles other than those emphasizing a system of authority, responsibility and command. Unity of command, in the classical sense, is closely related to the assumption that authority and command are essential. Yet, if unity of command does not necessarily result in greater productivity than disunity of command, it appears that the importance of authority and command are lessened in importance.

McGregor's Theory X assumes the importance of authority, responsibility and command because it assumes that people are by nature indolent and must be coerced to put forth their best effort in their work. Yet, if we continue to organize by authority, responsibility and command, the assumptions of Theory X tend to be self perpetuating as a result. Longenecker was quoted earlier as indicating that dual command gave the worker a built in alibi not to do his best work. This statement supports the assumptions of Theory X also. On the other hand, if individuals' attitudes toward work are not properly described by Theory X, then perhaps having two bosses, who may even give conflicting directives, should have little adverse effect on productivity. In other words, if employees are committed to the desirability of the work they are doing, as Theory Y assumes, it appears that the command situation may have little to do with the amount of their productivity. Yoder would also possibly lean toward the findings of the first two experiments since he also challenged the use of authority as the basis of organizational theory.

The findings of Experiments I and II have implications for the assumptions of McGregor's Theory Y in which employees are assumed to be motivated to productivity by internal personal objectives and motives rather than by the close supervision which might be provided by rigid enforcement of unity of command as classically defined.

Argyris would perhaps agree that formal organizational principles, in addition to producing "basic incongruencies between the growth trends of a healthy personality and the requirements of the formal organization", are also shown to have no real significant beneficial effect on the productivity of the enterprise. Unity of command is one of the cornerstones of formal organizational principles. If the findings of the first two experiments of this study are accepted as valid, then perhaps greater concern should be given to the effects of the organizational structure on the personality of employees, rather than continuing to emphasize the necessity of formal organizational principles as a means of fixing responsibility for productivity.

Simon would perhaps applaud the findings of Experiments I and II because they add to his contention that formal organizational principles are proverbs and essentially useless. He contended that, "For almost every principle, one can find an equally plausible and acceptable contradictory principle. Although the two principles of the pair will lead to exactly opposite organizational recommendations, there is nothing in the theory to indicate which is the proper one to apply."¹

The findings of Experiments I and II appear to support the thesis of Elton Mayo and others connected with the

¹Herbert A. Simon, "The Proverbs of Administration," Public Administration Review, VI (1946), p. 53.

Hawthorne experiments. These experimenters found that productivity was more related to interpersonal and psychological factors than to physical factors of work environment. Mayo's thesis was related to the advantages to be derived from involving the workers in the decision process. He questioned strongly the "rabble hypothesis"--that materialistic goals are the only motivating force and that authoritarian leadership is essential to get the lazy worker to put forth adequate effort.² The findings of this dissertation similarly raise doubt concerning the ability of traditional organizational principles to always stimulate an individual's best effort. In Experiments I and II, controls were used to eliminate extraneous factors which might influence the subjects, other than the independent variable. However, there were probably personal, social and human factors which were uncontrollable, which may have had greater influence on the behavior of the subjects than the organizational features being simulated.

For example, in Experiment II there may have been a manifestation of what Gellerman called the Hawthorne effect.³ That is, the subjects in the experimental group may have felt that they were receiving extraordinary attention, making them

²Elton Mayo, The Social Problems of an Industrial Civilization (Boston: Graduate School of Business Administration, Harvard University, 1945), pp. 44-46.

³Saul W. Gellerman, The Management of Human Relations (New York: Holt, Rinehart and Winston, 1966), p. 28.

more aware of themselves and the importance of their work, thus enhancing their productivity and morale. On the other hand, since the administrator in Phase II of Experiment II merely told the control group to continue doing what they had done before, this group may have felt the absence of any special attention or any particular importance of their work, thus having a depressing effect on their morale and productivity. Perhaps intensive in depth follow-up interviews with the subjects, such as those conducted by Mayo and his associates, would have shed more light on this assumption.

In general, Experiments I and II tend to lend substance to the contentions of those who believe that the productivity of individuals is more influenced by the interpersonal relations and psychological factors than by structural aspects of organization and management.

The findings of Experiments I and II tend to support the contention that plural command can be successfully used. Several examples of plural command were previously mentioned. Some of these, such as plural presidency and matrix organization, seem to be successfully used in large complex organizations. Often these are criticized on the basis that they violate unity of command. These criticisms have had strong influence, but the findings of this study might tend to weaken the effectiveness of such criticisms.

Those who strongly subscribe to the "one boss" concept of unity of command might be inclined to discount the findings

of Experiments I and II because there were two bosses in both groups. They might argue that the findings of no significant difference between the control group and the experimental group were the result of having disunity of command in both cases.

Experiment III.

The findings of Experiment III, which indicated significantly higher production under unity of command than under disunity of command, tend to support the declaration of Fayol that unity of command is important in an organization. It is significant, however, that Fayol never actually claimed that individuals were more productive under unity of command than they would be under disunity of command. The findings of Experiment III might also be in harmony with the feelings of Gulick and Urwick that a worker in a position of disunity of command, such as the experimental group of this experiment, would be confused and inefficient. There was certainly strong evidence that the experimental group was confused and less efficient as defined by the measurements used.

The findings of Experiment III might suggest that especially in those instances where a worker cannot resolve the problem of conflict, disunity of command has an adverse effect on his performance. In this experiment, the instructions were given in written form and subjects were not allowed to ask questions of the administrator to resolve

their conflicting directives. The possibility is suggested that the conflicts presented by disunity are more apparent in the case of written as compared to visual or oral instructions.

Suggestions for Further Research

This study was only an initial inquiry into the area of laboratory experiments to investigate human behavior under conditions of unity of command versus disunity of command. Many questions are still unanswered and perhaps some of the unanswered questions constitute a contribution of the study in laying a foundation for additional research in this area. Some possibilities for more research related to this area are discussed below:

1. Additional research is needed to test the differences in behavioral responses under the "one boss" definition of unity of command as opposed to the unified instructions definition adopted in this study.
2. Additional research on unity of command is needed to determine the long run effects of unity of command as opposed to disunity of command. In this study all experiments covered only a short time period. A longer period of time might have different effects on productivity or morale.

3. Research might be conducted to determine the relative effects of unity and disunity of command when there is feedback of results to individuals. In the experiments reported in this study, subjects were not told how their output was evaluated. Feedback of favorable or unfavorable results might uncover additional or different behavioral responses of individuals.
4. Additional research is needed to determine the relative effects of unity and disunity of command under various forms of instructions. The three experiments in this study utilized visual, oral and written instructions respectively. Another study might test whether one form of communication as opposed to other forms of communication was a critical factor.
5. More research might be conducted to determine whether unity of command was more influential in affecting productivity or morale. Experiment II suggested the possibility that unity of command might have more effect on morale than on productivity.
6. Research might be conducted to determine whether unity of command is more critical for men or women. In Experiment II all but one of the subjects were female and in Experiment III

all subjects were male. It might be assumed that sex was influential in the results of these experiments.

7. Additional research might be conducted in an industrial setting in which unity of command and disunity of command could be introduced while maintaining appropriate controls. This would have the advantage of more realism and perhaps more applicability to actual work situations. Consideration was given to conducting such a field experiment as a part of this study. It was concluded that it would be very difficult to maintain controls and obtain unambiguous measures of performance. There are also practical problems of finding industries willing to submit their employees to possible stress and strain that might occur in the experiments.
8. Perhaps additional research could be conducted to test the same hypothesis utilized in this study, employing continuous alternating verbal unified and disunified commands. This might be similar to Experiment III except verbal commands would be utilized. Control of the personality variable of the supervisors is a critical area of control in this type of experiment.

9. More research is needed to learn more about human behavior under other classical principles of formal organization theory.

Conclusions

The findings of these experiments imply that while the principle of unity of command may be a useful general guide to organizational practice, it should not be considered as a universal absolute or as a dictum to be followed rigorously in organizations. There are some situations in which strict observation of the principle of unity of command may be essential for organizational efficiency, but at the same time these findings suggest that there are situations in which close application of the principle may have no significant effects at all on the behavior of individuals.

The principle of unity of command may be necessary in many cases. However, in the specific situations described here, it appears that it would not be sufficient for attaining organizational effectiveness.

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APPENDICES

APPENDIX A

APPENDIX A

Exhibit 1

Instruction Sheet for Experiment I

PORTHOLE ASSEMBLY PROBLEM

Problem: You will be shown two illustrations of an apparatus called a porthole assembly. The illustrations will be exposed to your view for approximately 20 seconds. After the illustrations are removed from your view, you are to construct as many of the portholes as you can during an allowed assembly time. Your portholes are to be exactly like the one in the illustrations.

Supplies: You will be provided with the following supplies.

- (1) Stapler and staples.
- (2) A supply of 3 X 5 and 4 X 6 index cards.

Loading Stapler: Your stapler is not loaded. In order to load your stapler proceed as follows: (1) lift top of stapler; (2) draw spring plunger back; (3) place a single strip of staples into channel and gently release spring plunger; (4) close top of stapler.

You may need to reload the stapler during the assembly operation.

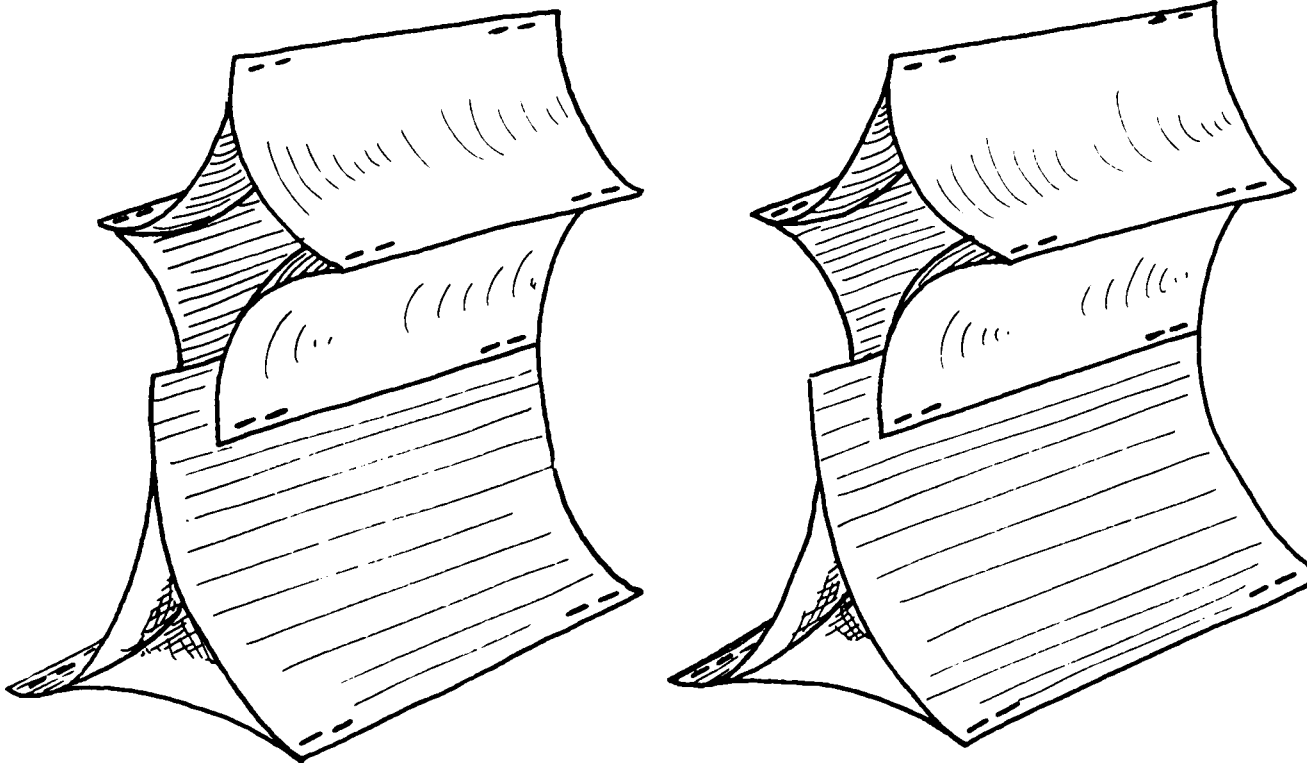
Requirements:

- (1) Construct as many of the portholes as you can in the assembly time.
- (2) All portholes you construct should be alike and they should be exactly like the one shown in the illustrations.
- (3) After the construction time has expired, place this sheet and all your portholes at your work place.
- (4) Please do not ask any questions or make remarks after the illustrations have been placed in your view or during the assembly time.
- (5) If your stapler gives you trouble, adjust it yourself and try to get it to operating again.

APPENDIX A

Exhibit 2

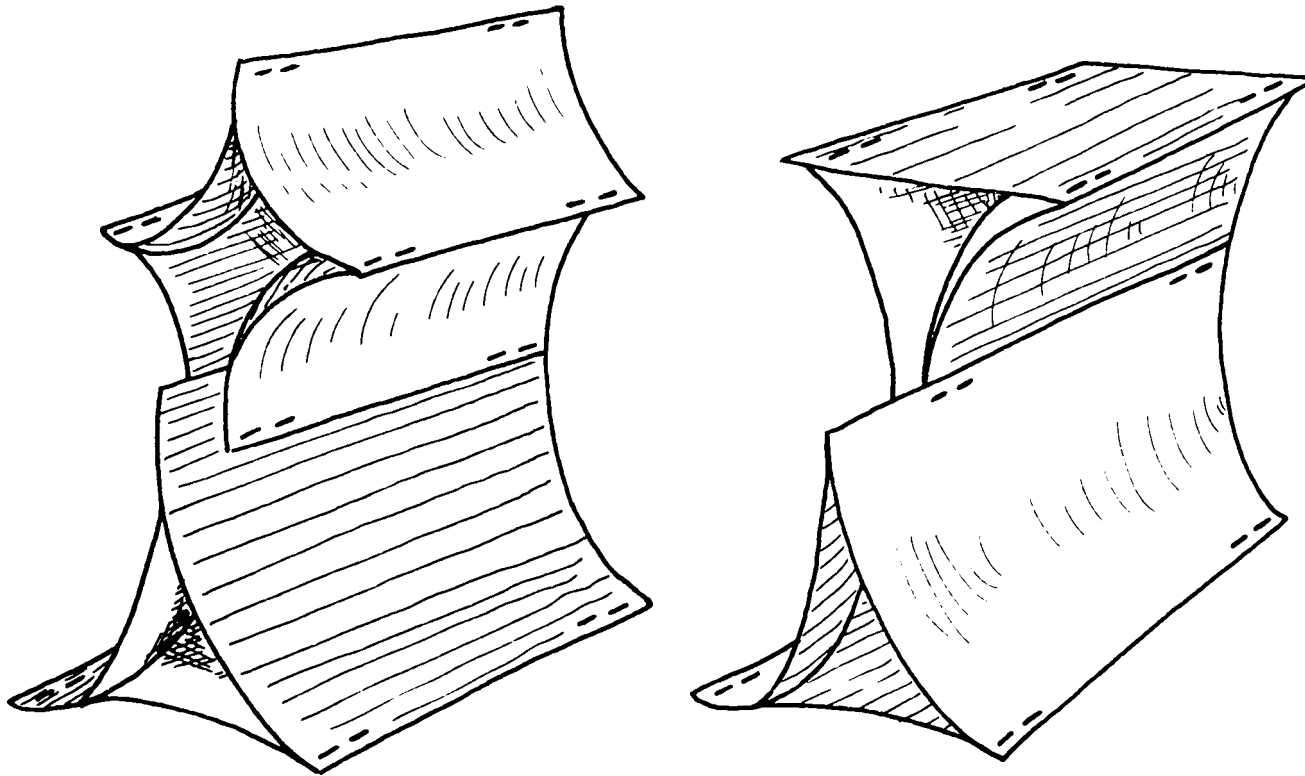
Two Illustrations Giving Visual Unified Directions
Control Group Experiment I



APPENDIX A

Exhibit 3

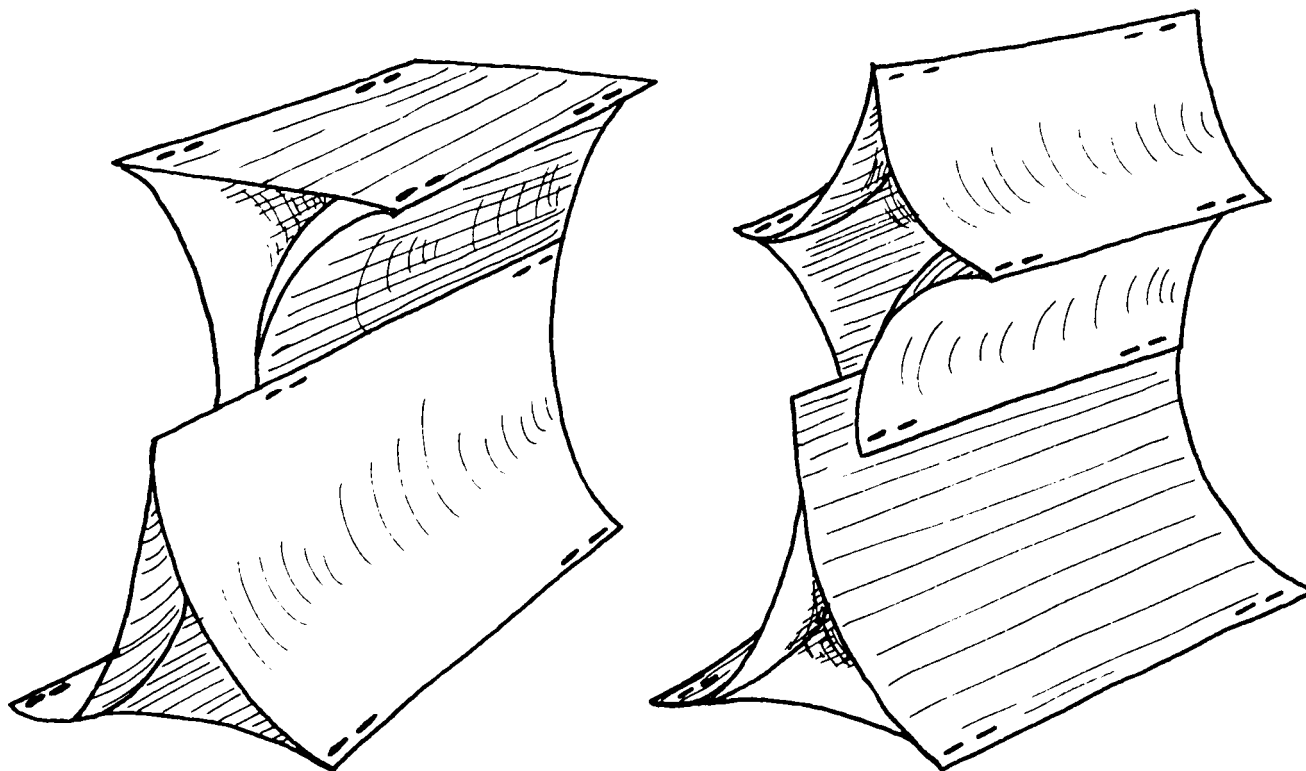
Two Illustrations Giving Visual Disunified Directions To First Half Of
Experimental Group of Experiment I



APPENDIX A

Exhibit 4

Two Illustrations Giving Visual Disunified Directions to Second Half Of
Experimental Group of Experiment I



APPENDIX B

APPENDIX B

Exhibit 1

Request Letter Typed In Phase I Experiment II

March 17, 1971

Dear Office Manager:

Will you please take about 5 minutes of your time to complete the enclosed questionnaire? We are collecting information and data related to the working conditions of clerical workers.

We realize that your time is valuable, so the questionnaire has been designed to take the least amount of time and effort possible. The research findings will hopefully be valuable to your company, thus justifying the investment of your time in completing this questionnaire.

A complimentary copy of the results of the study will be available to you at the conclusion of the study. The purpose of the questionnaire is to determine office managers' opinions of working conditions which are most conducive to efficiency of clerical workers. We are especially interested in such factors as office decor, number of frequency of coffee breaks and the number of supervisors to whom clerical workers report and take instructions.

Please be assured that neither you nor your company will be identifiable with any opinions or data within the study. However, results will be coded so that each office manager may see how his opinions and the data related to his own company compares to other companies surveyed in this study.

Your completing the questionnaire and returning it to us will be very helpful and most appreciated. If you would like to have a complimentary copy of the results of the study, please sign your name and address on the last page of the questionnaire.

Sincerely yours,

Robert Hegglund
Project Director

James Wilson
Research Associate

no

Enclosure

APPENDIX B

Exhibit 2

Request Letter Typed By Experimental Group
Phase II Experiment II

April 15, 1971

Dear Office Manager:

Will you please take about 45 minutes of your time to complete the enclosed questionnaire? We are collecting information and data related to the working conditions of clerical workers.

We realize that your time is valuable, so the questionnaire has been designed to take the least amount of time and effort possible. The research findings will hopefully be valuable to your company, thus justifying the investment of your time in completing this questionnaire.

A complimentary copy of the results of the study will be available to you at the conclusion of the study. The purpose of the questionnaire is to determine office managers' opinions of working conditions which are most conducive to efficiency of clerical workers. We are especially interested in such factors as office lighting and arrangement, type of equipment and the number of supervisors to whom clerical workers report and take instructions.

Please be assured that neither you nor your company will be identifiable with any opinions or data within the study. However, results will be coded so that each office manager may see how his opinions and the data related to his own company compares to other companies surveyed in this study.

Your completing the questionnaire and returning it to us will be very helpful and most appreciated. If you would like to have a complimentary copy of the results of the study, please enclose a stamped, self-addressed envelope with the questionnaire

Sincerely yours,

James Wilson
Project DirectorRobert Hegglund
Research Associate

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Enclosure

APPENDIX C

APPENDIX C

Exhibit 1

Cover For Experiment III

AX

Page 1

THE RECTANGLE ARRANGEMENT PROBLEM

Problem: You are to draw and number five (5) rectangles which are arranged relative to each other in a prescribed manner as directed in the instructions on page two.

Assumptions: Each rectangle touches the preceding rectangle at "sensible" places--at corners or at midpoints along the side or the end of the rectangle. All angles formed by the touching of the rectangles are either 90° or 45° angles. Free hand accuracy is sufficient in the drawing of the rectangles. All rectangles are either horizontal, vertical, or slanted on the page.

Requirements: You are requested to read all of the instructions on page two. Draw your rectangle arrangement to fit into the space provided on page two. Please do not ask questions after you have turned to page two.

You may use the back of this sheet for a worksheet if you desire, but be sure to show your final rectangle arrangement on page two.

Please do not turn to page two until instructed to do so.

Written Instructions Control Group Experiment III

AA

Page 2

DIRECTIONS FOR CONSTRUCTION OF RECTANGLES

Assume that you have two bosses who give you the following instructions on how to construct the rectangle arrangement. Each boss has equal authority and each of their instructions are to be considered equally binding. For convenience we will call these bosses Boss A and Boss B. Be sure to draw only one diagram of five rectangles and be sure to number each rectangle.

Boss A: Draw Rectangle 1 horizontal on the page.

Boss B: Draw Rectangle 1 horizontal on the page.

Boss A: Draw Rectangle 2 immediately below Rectangle 1, also horizontal on the page. Its upper left corner is at the midpoint of the lower side of Rectangle 1 forming a 90° angle.

Boss B: Draw Rectangle 2 immediately below Rectangle 1, also horizontal on the page. Its upper left corner is at the midpoint of the lower side of Rectangle 1 forming a 90° angle.

Boss A: Draw Rectangle 3 to the right of Rectangle 2, slanted in such a way that the lower right corner of Rectangle 2 touches Rectangle 3 at the midpoint of the left side of Rectangle 3, forming two 45° angles.

Boss B: Draw Rectangle 3 to the right of Rectangle 2, slanted in such a way that the lower right corner of Rectangle 2 touches Rectangle 3 at the midpoint of the left side of Rectangle 3, forming two 45° angles.

Boss A: Draw Rectangle 4 vertical on the page. The upper right corner of Rectangle 3 touches it at the midpoint of its left side forming two 45° angles.

Boss B: Draw Rectangle 4 vertical on the page. The upper right corner of Rectangle 3 touches it at the midpoint of its left side forming two 45° angles.

Boss A: Draw Rectangle 5 horizontal on the page below Rectangle 4. Its upper side is parallel to the lower end of Rectangle 4. The upper left corner of Rectangle 5 is positioned at the midpoint of the lower end of Rectangle 4, forming a 90° angle.

Boss B: Draw Rectangle 5 horizontal on the page below Rectangle 4. Its upper side is parallel to the lower end of Rectangle 4. The upper left corner of Rectangle 5 is positioned at the midpoint of the lower end of Rectangle 4, forming a 90° angle.

SHOW YOUR RECTANGLE ARRANGEMENT IN SPACE BELOW

Written Instructions First Half Experimental Group Experiment II

XA

Page 2

DIRECTIONS FOR CONSTRUCTION OF RECTANGLES

Assume that you have two bosses who give you the following instructions on how to construct the rectangle arrangement. Each boss has equal authority and each of their instructions are to be considered equally binding. For convenience we will call these bosses Boss A and Boss B. Be sure to draw only one diagram of five rectangles and be sure to number each rectangle.

Boss A: Draw Rectangle 1 horizontal on the page.

Boss B: Draw Rectangle 1 horizontal on the page.

Boss A: Draw Rectangle 2 immediately below Rectangle 1, also horizontal on the page. Its upper left corner is at the midpoint of the lower side of Rectangle 1 forming a 90° angle.

Boss B: Draw Rectangle 2 vertical on the page and above Rectangle 1. Its lower end is parallel to the upper side of Rectangle 1. The upper right corner of Rectangle 1 is positioned at the midpoint of the lower end of Rectangle 2, forming a 90° angle.

Boss A: Draw Rectangle 3 to the right of Rectangle 2, slanted in such a way that the lower right corner of Rectangle 2 touches Rectangle 3 at the midpoint of the left side of Rectangle 3, forming two 45° angles.

Boss B: Draw Rectangle 3 to the right of Rectangle 2, slanted downward with the upper left corner of Rectangle 3 touching Rectangle 2 at the midpoint of the right side of Rectangle 2, forming two 45° angles.

Boss A: Draw Rectangle 4 vertical on the page. The upper right corner of Rectangle 3 touches it at the midpoint of its left side forming two 45° angles.

Boss B: Draw Rectangle 4 horizontal on the page to the right of Rectangle 3. Its lower left corner is positioned at the midpoint of the upper side of Rectangle 3, forming two 45° angles.

Boss A: Draw Rectangle 5 horizontal on the page below Rectangle 4. Its upper side is parallel to the lower end of Rectangle 4. The upper left corner of Rectangle 5 is positioned at the midpoint of the lower end of Rectangle 4, forming a 90° angle.

Boss B: Draw Rectangle 5 immediately above Rectangle 4, also horizontal on the page. Its lower left corner is at the midpoint of the upper side of Rectangle 4 forming a 90° angle.

SHOW YOUR RECTANGLE ARRANGEMENT IN SPACE BELOW

Written Instructions For Second Half Experimental Group
Experiment III

XB

Page 2

DIRECTIONS FOR CONSTRUCTION OF RECTANGLES

Assume that you have two bosses who give you the following instructions on how to construct the rectangle arrangement. Each boss has equal authority and each of their instructions are to be considered equally binding. For convenience we will call these bosses Boss A and Boss B. Be sure to draw only one diagram of five rectangles and be sure to number each rectangle.

Boss A: Draw Rectangle 1 horizontal on the page.

Boss B: Draw Rectangle 1 horizontal on the page.

Boss A: Draw Rectangle 2 vertical on the page and above Rectangle 1. Its lower end is parallel to the upper side of Rectangle 1. The upper right corner of Rectangle 1 is positioned at the midpoint of the lower end of Rectangle 2, forming a 90° angle.

Boss B: Draw Rectangle 2 immediately below Rectangle 1, also horizontal on the page. Its upper left corner is at the midpoint of the lower side of Rectangle 1 forming a 90° angle.

Boss A: Draw Rectangle 3 to the right of Rectangle 2, slanted downward with the upper left corner of Rectangle 3 touching Rectangle 2 at the midpoint of the right side of Rectangle 2, forming two 45° angles.

Boss B: Draw Rectangle 3 to the right of Rectangle 2, slanted in such a way that the lower right corner of Rectangle 2 touches Rectangle 3 at the midpoint of the left side of Rectangle 3, forming two 45° angles.

Boss A: Draw Rectangle 4 horizontal on the page to the right of Rectangle 3. Its lower left corner is positioned at the midpoint of the upper side of Rectangle 3, forming two 45° angles.

Boss B: Draw Rectangle 4 vertical on the page. The upper right corner of Rectangle 3 touches it at the midpoint of its left side forming two 45° angles.

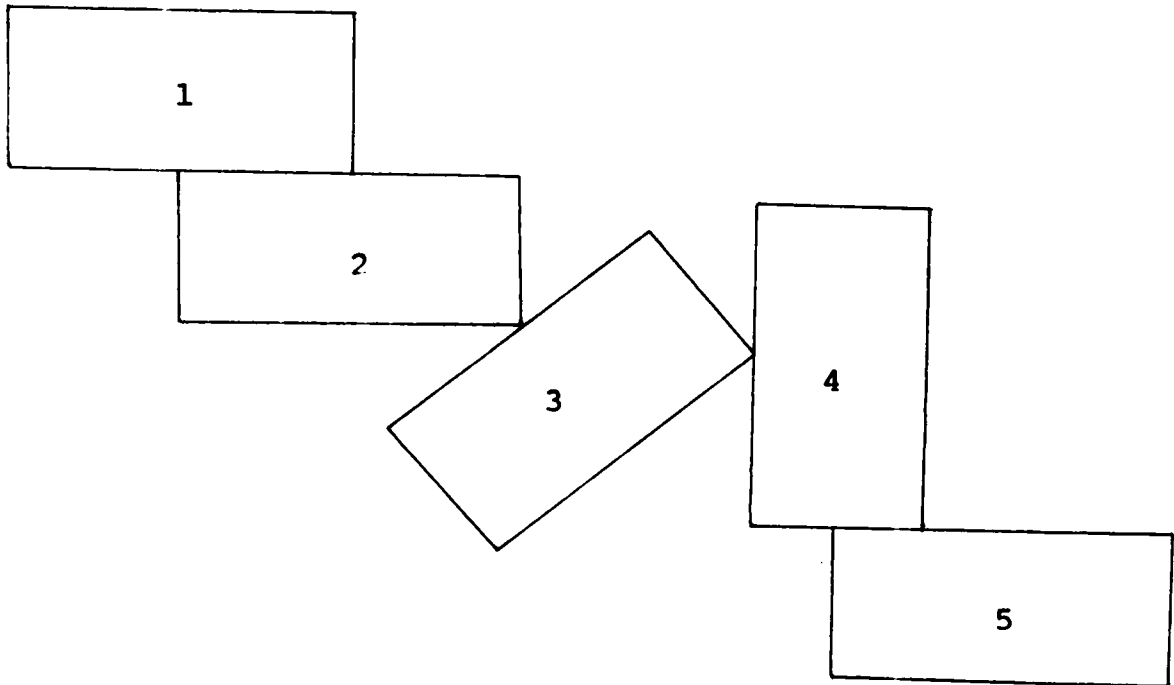
Boss A: Draw Rectangle 5 immediately above Rectangle 4, also horizontal on the page. Its lower left corner is at the midpoint of the upper side of Rectangle 4 forming a 90° angle.

Boss B: Draw Rectangle 5 horizontal on the page below Rectangle 4. Its upper side is parallel to the lower end of Rectangle 4. The upper left corner of Rectangle 5 is positioned at the midpoint of the lower end of Rectangle 4, forming a 90° angle.

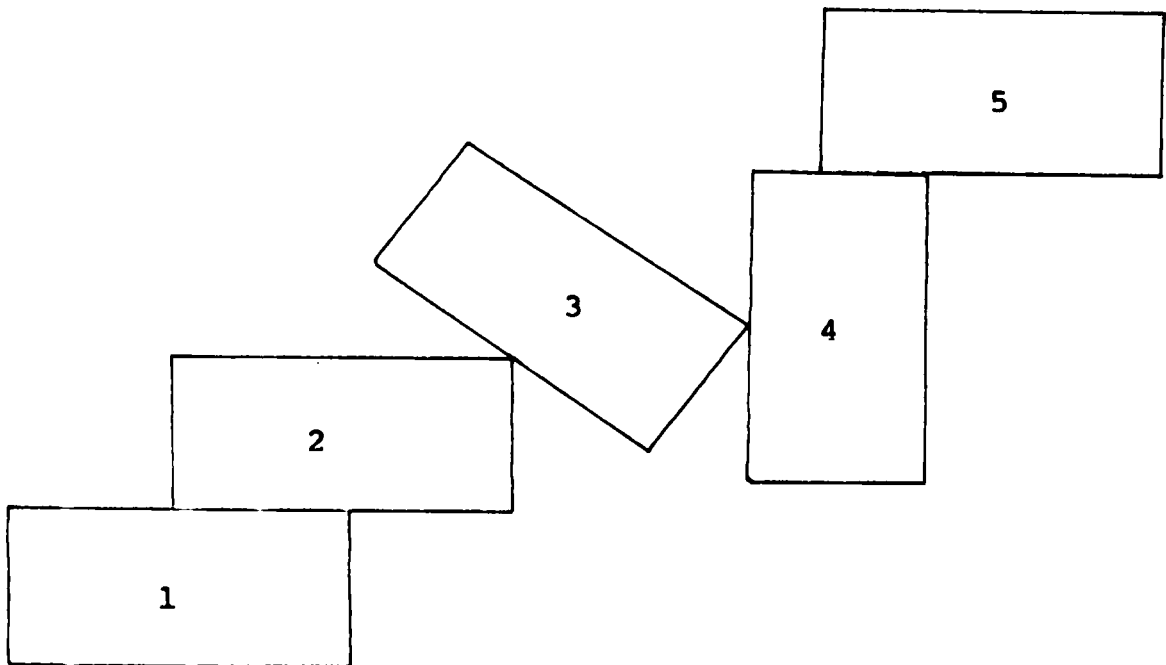
SHOW YOUR RECTANGLE ARRANGEMENT IN SPACE BELOW

RECTANGLE ARRANGEMENT EXPERIMENT

Correct Rectangle Arrangement for Control Group



Mirror Image of Correct Rectangle Arrangement



APPENDIX D

Abstract of a dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

SOME LABORATORY EXPERIMENTS TO TEST
THE UNITY OF COMMAND PRINCIPLE

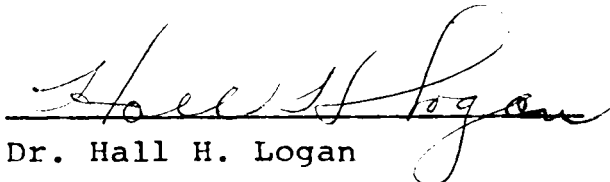
Abstract of a dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

By

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M.B.A. West Texas State College, 1956

1971
The University of Arkansas

This abstract is approved by


Dr. Hall H. Logan

ABSTRACT

SOME LABORATORY EXPERIMENTS TO TEST THE UNITY OF COMMAND PRINCIPLE

This study reports on three separate laboratory experiments designed to test the validity of the principle of unity of command. This principle of classical organization theory had its popular beginning with Henri Fayol and is based on common sense and experience, but has apparently never been scientifically tested using objective measures of performance. The null hypothesis was stated as follows: "There is no significant difference in the performance or morale of individuals who work under conditions of unity of command and individuals who work under conditions of disunity of command".

Subjects in each experiment performed tasks under controlled conditions in which the independent variable was the presence of unity of command for the control group and disunity of command for the experimental group. The dependent variable was performance on the experimental tasks and a measure of the subjects' morale as evidenced by scores on a semantic differential scale. Significance of difference between the control group and the experimental group was determined by the t test at the .05 level of significance.

In the first experiment, the null hypothesis was not rejected. There was no significant difference in the performance of the control group and the experimental group.

There was also no significant difference in the morale, as measured by the semantic differential scale, of the two groups.

In the second experiment, there was no significant performance difference between the control group and the experimental group. The morale, as measured by the semantic differential scale, was shown to be significantly higher for the experimental group than for the control group.

In the third experiment, the control group's performance and morale were significantly greater than that of the experimental group.

The findings of these experiments imply that while the principle of unity of command may be a useful general guide to organizational practice, it should not be considered as a universal absolute or as a dictum to be followed rigorously in organizations.

The principle may be necessary in many cases, but it should not be considered as sufficient for attaining organizational effectiveness.